

TOSHIBA

Interface Driver ICs

PRODUCT GUIDE

INTERFACE DRIVER IC

Transistor arrays

TD62xxx SERIES

Multi-chip transistor arrays

TD62Mxxxxx SERIES

Intelligent drivers

TB62xxx SERIES

Monolithic DMOS transistor arrays

TB62xxx SERIES

In recent years, dedicated custom ICs (ASICs) meeting specifications of various users have been widely used mainly for controlling electronic equipment. On the other hand, general purpose ICs, such as operational amplifiers, regulators, transistor arrays, and various gate ICs, are used in circuits which do not require ASICs. Applications for which such off-the-shelf devices suffice include linear interfaces, output driving circuits, and other common, non-specialized applications.

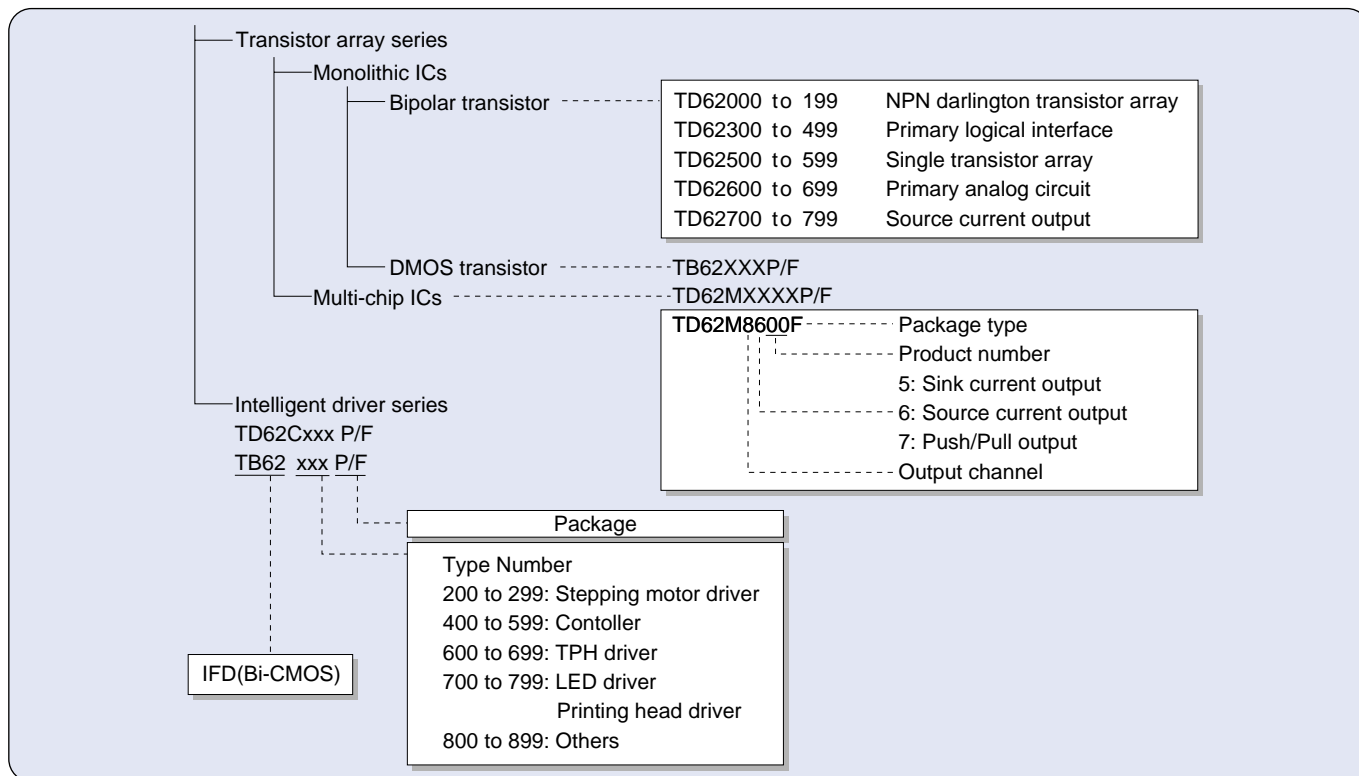
In particular, general-purpose transistor arrays have become indispensable as partners of ASICs because of their merits of large current driving capability and high efficiency as drivers (due to low saturation voltage and low current consumption.)

In addition to our general-purpose transistor array bipolar ICs, the TD62xxx Series, and the TB62xxx Series LED drivers that utilize a Bi-CMOS manufacturing process, we have expanded our comprehensive product line with the new multi-chip TD62Mxxxxx Series that features two or more discrete chips sealed in an IC package, and also the monolithic DMOS TB62xxx Series.

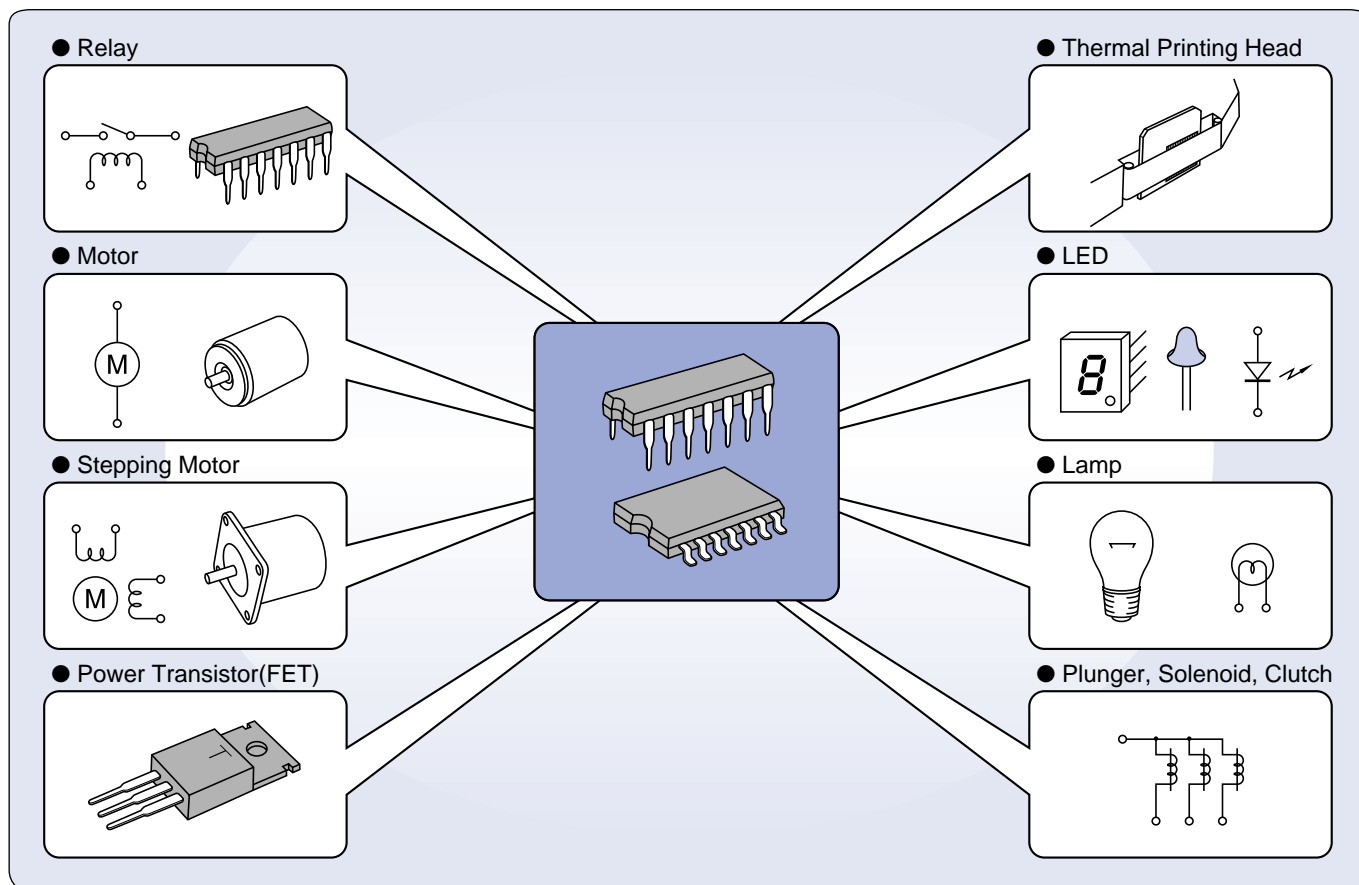


General Information

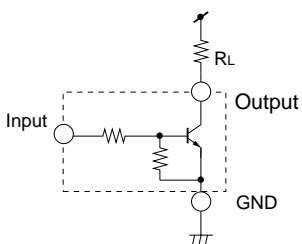
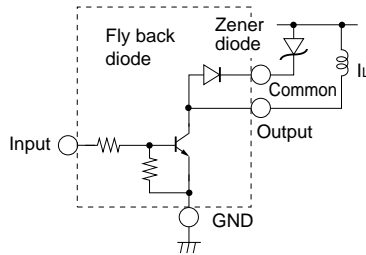
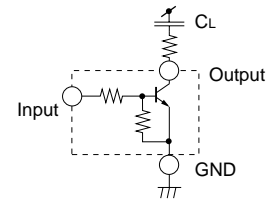
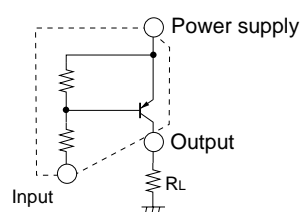
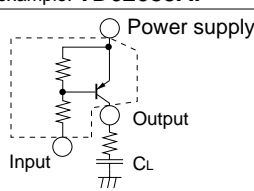
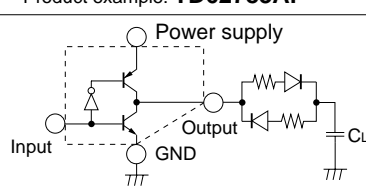
IFD Family Tree



Applications



Output Circuits by Application

Application	Thermal printing head	Plunger, solenoid, clutch, stepper motor	Piezo printing head
Load impedance	Resistance	Inductance	Capacitance
Representative circuits	 <p>Product example: TD62003AP</p>	 <p>Product example: TD62308AP/BP-1 TD62064AP/BP-1</p>	 <p>Product example: TD62083AP</p>
	 <p>Product example: TD62706P/F</p>		 <p>Product example: TD62783AP</p>
			 <p>Product example: TD62981P</p>

Recommended Product Numbers for Certain Application

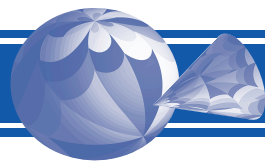
Application Market		Driver						Printing head driver		Level shift driver	FET driver	Special driver
		Plunger	Solenoid	Clutch	Stepper motor	LED	Relay	Impact	Non-impact TPH/BJ Inkjet			
Plain Paper Copier (PPC) (analog, digital)		308AF	308F	308F	308AP ☆200AF	304AP	003AF			593AP	503P	
Laser Beam Printer (LBP)		003AP	382F 387AP		308BP-1 ☆200AF	003AP	503P			593AP	503P	
Printer (Dot-impact)					308BP-1 ☆200AF			064BP-1 308BP-1		593AP	503P	
Printer (Non-impact)					064AP /BP-1				C805F ☆600F M8604AF 708N	593AP	503P	
Printer (Non-impact)	Bubble jet				☆200AF					382AP	503P	
	Inkjet								UD			
Word processor					064AP				☆600F	593AP	503P	
Typewriter					308BP-1					593AP	503P	
Vending machine			064AP 003AP			064AP 783F	783AF 083AF			502P/F 503P/F	503P	650F~652F
NC* machine tool		308AP				003AP	107P 707AP			593AP	503P	
Robot		308AP				003AP	083AP			593AP	503P	
Pachinko			308AP 064AP			LED 503P	783AP 083AP			503P 504P	503P	601/602P 603/604P
Fax			083AP 387AP		003AP ☆200AF							
Automotive			083AP				503F 706F			503P/F 504P/F		601/602P 603/604P
Home appliance					003AP 003AF	003AP 304AP	003AP 003AF				930P/F	
LED panel						M8600F LED						

☆ : TB62xx Series; all others are TD62xx Series * Numerical Control

LED : ☆701AN ☆705CF ☆706BN ☆707F ☆708N ☆709N ☆710N ☆713N ☆715☆717

CCD : TB62801F

UD: Under development



Selection Guide

Input		Source current interface (PNP transistor input)			
Output		Sink current		Source current	
		Single	Darlington	Single	Darlington
Output current (A)	0.2	TD62601P/F (6) TD62604P/F (6) TD62382AP/F/AFN (8) TD62476~479P (2)		TD62703P/F (6)	
	0.5	TD62303P/F (6) TD62383P (8)	TD62304P/AP/F/FB/AFN (7) TD62305P/AP/F/FB/AFN (7) TD62384AP/F/AF (8) TD62385AP/F/AF (8) TD62386~8AP/AF (8) TD62387AFN (8) TD62388AFN (8)	TD62785P/F (8)	TD62786AP/F/AF/AFN (8) TD62787AP/F/AF (8)
	1.5	TD62318AP/BP/AF/BF (4)	TD62308AP/APA/BP-1/AF/BF (4)	TD62M3601F 30 V (3) TD62M8603F 30 V (8)	
	2.0			TD62M3600F 10 V (3) TD62M4600F 10 V (4) TD62M4601F 20 V (4) TD62M8600F 10 V (8) TD62M8601F 20 V (8) TD62M8604AF 50 V (8)	

TD62xxxP/PA/F/FB/FN VCE(SUS) = 35 V
TD62xxxAP/APA/AF/AFN VCE(SUS) = 50 V
TD62xxxBP/BP-1/BF VCE(SUS) = 80 V
TD62xxxCP VCE(SUS) = 100 V

(n): Number of output channels

TB627xx Series LED Drivers

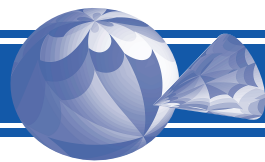
Device	Function	Rating	Package
TB62701AN	16-bit SIPO, latch and constant current driver	30 V / 50 mA	SDIP24
TB62705CP/CF/CFN	8-bit SIPO, latch and constant current driver	17 V / 90 mA	DIP16 / SSOP16 (1.00) / SSOP16 (0.65)
TB62706BN/BF	16-bit SIPO, latch and constant current driver	17 V / 90 mA	SDIP24 / SSOP24
TB62707F	8-bit PIPO, latch and constant current driver	17 V / 90 mA	SSOP24
TB62708N	16-bit SIPO, latch and constant current source driver	17 V / -90 mA	SDIP30
TB62709N/F	4-character, 7-segment LED display, decoder and driver (anode common type)	17 V / 40 mA, -320 mA / Dig	SDIP24 / SSOP24
★TB62710P/F	8-bit SIPO, latch and constant current source driver	7 V / -90 mA	DIP20 / SSOP24
TB62713N/F	7 × 5 dot display LED decoder and driver (common cathode low type)	17 V / 50 mA, -400 mA / Com	SDIP24 / SSOP24
★TB62715FN	8-bit SIPO, latch and constant current driver	17 V / 150 mA	SSOP24 (0.65)
★★TB62716F	16-bit SIPO, latch and constant current driver	17 V / 150 mA	HSOP36 (0.65)
★TB62717N/F	24-bit SIPO, latch and constant current driver	17 V / 50 mA	SPIP42 / QFP48 (0.8)

★: New product ★★: Under development

Note: SIOP: Serial-In, Parallel-Out
SIOP: Serial-In, Parallel-Out

Sink current input (NPN transistor input)			
Sink current		Source current	
Single	Darlington	Single	Darlington
TD62300P/F (2) TD62301P/F (7) TD62302P/F (7) TD62306P/F (6) TD62307P/F (7) TD62445FN (4) TD62501~504P/F (7) TD62502FN (7) TD62503FN (7) TD62504FN/P-H (7) TD62507P/F (5) TD62551~555S (4) TD62583AP/F/AF (8) TD62591~594AP (8) TD62593AFN (8) TD62594AFN (8) TD62595~598AP/AF (8) TD62597AFN (8) TD62598AFN (8) TD62380P (8)	TD62006P/F (6) TD62007P/F (7)	TD62505P/F (7) TD62506P/F (7)	TD62705P/F (6) TD62706P/P-H/F/FA-H (6) TD62781AP/F/AF (8) TD62782AP/F/AF (8) TD62771AP (7)
TD62381P/F/FN (8)	TD62001~004P/AP/F/AF (7) TD62003PA/APA/FB (7) TD62004PA/APA/FB (7) ULN2003AP/AFW (7) ULN2004AP/AFW (7) TD62008AP/F/AF (7) TD62081~084AP/CP/F/AF (8) TD62083AFN/APA (8) TD62084AFN (8) ULN2803AP/AFW (8) ULN2804AP/AFW (8) TD62101~105P/F (8)		TD62783AP/APA/F/AF/AFN/AFW (8) TD62784AP/F/AF/AFN/AFW (8)
TD62164AP/BP/AF/BF (4) TD62309P/F (6) TD62M4503AFN 60 V (4)	TD62064P/AP/APA/BP-1/F/AF/BF (4) TD62074P/AP/F/AF (4) TD62107P/BP/F (4)		TD62707AP (4)
TD62M4500F 10 V (4) TD62M4501F 20 V (4) TD62M8500F 10 V (8) TD62M8501F 20 V (8)			TD62708N (8)

DMOS Transistor Array	
TB62003~4, 6~9P/F/FW	35 V / 0.2 A (8)
Push/Pull Driver Array	
TD62981P	120 V / +20 mA, -10 mA (8)
TD62921S	120 V / +20 mA, -10 mA (2)
TD62930P/F	30 V / ±0.1 A (3)
TD62M2701F	10 V / ±2 A (2)
TD62M2702F	10 V / ±2 A (2)
TD62M3700F	30 V / ±1.5 A (3)
TD62M3701F	10 V / ±2 A (3)
TD62M3702F	15 V / ±2 A (3)
TD62M3704F	10 V / ±5 A, -2 A (3)
TD62M4700F	10 V / ±2 A (2)



Monolithic Transistor Arrays

Alternative Products Guide

TOSHIBA	ALLEGRO	T.I.	SGS/ THOMSON	MOTOROLA	MITSUBISHI	SANYO	ROHM	NEC	PHILIPS
TD62001P/AP	ULN2001A▲, ULN2001A△ ULN2021A☆, ULS2001H▽	ULN2001AN▲	ULN2001A▲	MC1411P▲	M54524P▲	LB1231▲		μPA2001C▲	ULN2001N▲ NE5501▲
TD62002P/AP	ULN2002A▲, ULN2012A△ ULN2022A☆, ULN2002H▽	ULN2002AN▲	ULN2002A▲	MC1412P▲	M54525P▲	LB1232▲		μPA2002C▲	ULN2002N▲
ULN2003AP TD62003P/AP	ULN2003A▲, (ULN2005A)▲ ULN2013A△, (ULN2015A)△ ULN2023A☆, (ULN2025A)☆ ULN2003H▽	ULN2003AN▲	ULN2003A▲	MC1413P▲	M54523P/FP▲	LB1233▲	BA12003▲	μPA2003C▲	ULN2003N▲
ULN2004AP TD62004P/AP TD62006P	ULN2004A▲, ULN2014A△ ULN2024A☆, ULS2004H▽	ULN2004AN▲	ULN2004A▲	MC1416P▲	M54526P▲	LB1234▲	BA12004▲	μPA2004C▲	ULN2004N▲
TD62007P TD62008AP					(M54527P) M54531P	LB1274	BA664A BA614A	μPA2067C	
TD62064P/ AP/BP-1	(ULN2064B)▲, (ULN2066B)▲ (ULN2065B)■, (ULN2067B)■ (ULN2068B)▲, (ULN2070B)▲ (ULN2069B)■, (ULN2071B)■ (ULN2061M)■, (ULN2062M)■	SN75064▲ ULN2064▲ SN75065■ ULN2065■	(ULN2064B) (ULN2065B)	(ULN2068B)	M54532P● (M54594)■ (M54595)■ (M54662)■ (M54663)■	LB1235■			
TD62074P/AP	(ULN2074B)▲, (ULN2076B)▲ (ULN2075B)□, (ULN2077B)□	ULN2074▲ ULN2075□	(ULN2074B) (ULN2075B)	(ULN2074B)					
TD62081AP/CP	ULN2801A▲, ULN2811A△ ULN2821A☆		ULN2801A▲ L602□	ULN2801▲	M54591P□ M54522▲				
TD62082AP/CP	ULN2802A▲, ULN2812A△ ULN2822A☆		ULN2802A▲ L602□	ULN2802▲	M54592□				
ULN2803AP TD62083AP/CP	ULN2803A▲, ULN2813A△ ULN2823A☆, (ULN2805A) (ULN2815A)△, (ULN2825A)☆		ULN2803A▲ L603□	ULN2803▲	M54585P▲ M54590P□ (M54538P)▲				
ULN2804AP TD62084AP/CP	ULN2804A▲, ULN2814A△ ULN2824A☆		ULN2804A▲ L604□	ULN2804▲	M54522P▲ M54593P□				
TD62101P									
TD62103P									
TD62104P									
TD62105P					M54517P				
TD62107P TD62107BP									
TD62164AP/BP	(ULN2068B)▲, (ULN2070B)▲ (ULN2069B)■, (ULN2071B)■				(M5267P)■ (M54662)■ (M54663)■				
TD62300P									
TD62301P					(M54537P)	LB1261			
TD62302P									
TD62303P									
TD62304P/AP					M54566P▲				
TD62305P/AP						LB1710▲			
TD62306P						LB1269			
TD62307P					(M5265P)■ (M54528P) (M54576P/FP) (M54577P/FP)	LB1264 (LB1256) (LB1258)			
TD62308AP/ BP-1					M54567P▲ (M54661)■ M54596P■	LB1205■			
TD62309P TD62318AP/BP					M54539P (M5266P)■ M54574P▲ (M54661)■				
TD62380P					(M54584P)	(LB1257)			
TD62381P					(M54584P)	(LB1257)			
TD62382AP/AF					(M54565P/FP)				
TD62383P						LB1247			
TD62384AP					M54583P				
TD62385AP					M54583P				

●: P type (V_{sus} ≤ 35 V), ▲: AP type (V_{sus} ≥ 50 V), ■: BP type (V_{sus} ≥ 80 V), ★: CP type (V_{sus} = 100 V), (): Similar replacement, △: V_{CE(sus)} = 50 V, I_{out} = 0.6 A, ▽: Operating temperature range: -55 to 125°C, □: V_{CE(sus)} = 80 V, I_{out} = 0.5 A, ☆: V_{CE(sus)} = 95 V, I_{out} = 0.5 A.

TOSHIBA	ALLEGRO	T.I.	SGS/ THOMSON	MOTOROLA	MITSUBISHI	SANYO	ROHM	NEC	PHILIPS
TD62386AP					(M54587P)				
TD62387AP					M54587P				
TD62388AP					(M54587P)				
TD62476P	(UDN5711M)	(SN75476)		(MC1471P)	(M54601P)				
TD62477P	(UDN5712M)	(SN75477)		(MC1472P)	(M54602P)				
TD62478P	(UDN5713M)	(SN75478)		(MC1473P)	(M54603P)				
TD62479P	(UDN5714M)	(SN75479)		(MC1474P)	(M54604P)				
TD62501P	(ULN2031A)					LB1211			
TD62502P						(LB1212)			
TD62503P	(ULN2081A), (ULN2082A)				(M54514AP)	(LB1213)			
TD62504P						(LB1214)			
TD62505P	(ULN2032A), (ULN2033A)					LB1215			
TD62506P						LB1216			
TD62507P	(ULN2046A), (ULN2046A-1) (ULN2047A), (ULN2054A) (ULN2083A), (ULN2083A-1) (ULN2086A), (ULN2045H)▽ (ULS2083H)▽					LB1217			
TD62551S									
TD62553S									
TD62554S									
TD62555S									
TD62583AP					M54513				
TD62591AP									
TD62592AP									
TD62593AP					(M54584P) (M54538P)				
TD62594AP									
TD62595AP									
TD62596AP									
TD62597AP					(M54538P)				
TD62598AP									
TD62601P									
TD62602P									
TD62603P									
TD62604P									
TD62703P									
TD62705P									
TD62706P						(LB1294)			
TD62707AP									
TD62771AP									
TD62781AP	(UDN6118A)					LB1290			
TD62782AP	(UDN6128A)					LB1291			
TD62783AP	UDN2981A▲ UDN2983A □				M54563P▲ M54597P□ M54598P□			μPA2981C▲	
TD62784AP	UDN2580A▲, UDN2982A▲ UDN2984A □				M54562P▲ M54597P□			μPA2982C▲	
TD62785P	(UDN2580A)								
TD62786AP					M54581P (M54586P)				
TD62787AP					M54581P▲ (M54586P)▲ M54660P□				
TD62921S									
TD62981P									

●: P type (V_{sus} < 35 V); ▲: AP type (V_{sus} > 50 V); ■: BP type (V_{sus} > 80 V); ★: CP type (V_{sus} = 100 V); (): Similar replacement; △: V_{CE(sus)} = 50 V, I_{out} = 0.6 A; ▽: Operating temperature range -55 to 125°C; □: V_{CE(sus)} = 80 V, I_{out} = 0.5 A; ☆: V_{CE(sus)} = 95 V, I_{out} = 0.5 A.



Monolithic Transistor Arrays

● Bipolar Transistor Arrays

Toshiba bipolar transistor arrays have long been widely used as drivers for inductive loads (such as relays and solenoids), capacitance loads, and lamps, among others. We have further developed this product line in response to users' demands.

JEDEC Standard Package ULN2000 Series —Release—

Features

- Function and characteristics are same as TD62xxx series
- Series name: ULN2000 series
- Malaysia works products
- Package type — AP : DLP –16,18 pin
Package type — AFW: SOL–16,18 pin

DIP:



ULN2003AP



ULN2004AP



ULN2803AP



ULN2804AP

SOL:



ULN2003AFW



ULN2004AFW



ULN2803AFW



ULN2804AFW

To meet the requirements for more lightweight, low profile products, Toshiba now provides eighteen SSOP Series models of ultra-compact flat-package sealed products (0.65 mm pitch), and four HSOP (BF) models in 4-channel Series. These last are 80V products, that are best suited for stepper-motor drive uses.

SOP Series



SOP16-P-225-1.27



SOP18-P-375-1.27



SOP20-P-300-1.27

SSOP Series



SSOP16-P-225-0.65B



SSOP18-P-225-0.65

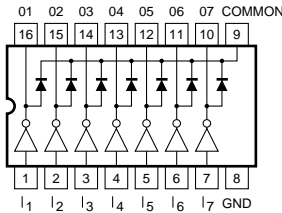
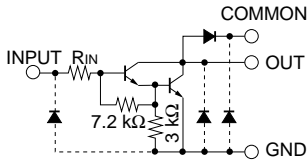
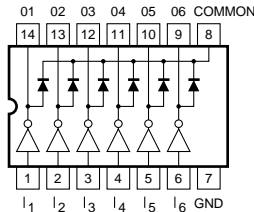
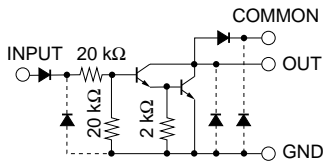
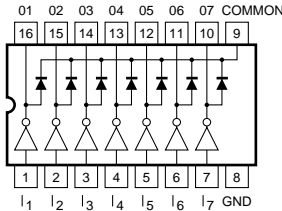
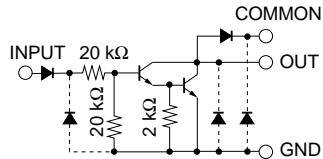
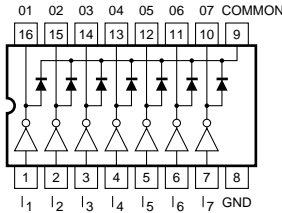
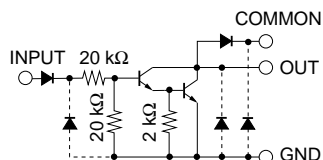


SSOP20-P-225-0.65A

SSOP Series

Device	Function	Output sustaining voltage (V)	Output current (mA)	Package	
TD62304AFN	7-ch Low-active Darlington sink drivers	50	500	SSOP16-P-225-0.65B	
TD62305AFN					
TD62502FN	7-ch single drivers	35	200		
TD62503FN					
TD62504FN					
TD62083AFN	8-ch Darlington sink drivers	50	500		
TD62084AFN					
TD62381FN	8-ch Low-saturation sink driver	15			
TD62382AFN	8-ch Low-active low-saturation sink driver	50	50		SSOP18-P-225-0.65
TD62593AFN	8-ch single drivers		200		
TD62594AFN					
TD62597AFN					
TD62598AFN					
TD62783AFN	8-ch Darlington source drivers		-500	500	SSOP20-P-225-0.65A
TD62784AFN					
TD62786AFN					
TD62387AFN	8-ch Low-active Darlington sink drivers				
TD62388AFN					

Bipolar Transistor Arrays (1)

Device	Function	Rating			Pin connections	Equivalent circuit	Package
		V _{OUT} (V)	I _{OUT} (mA)	Clamp diode			
TD62001P	7-ch Darlington sink drivers	35	500	○		<p>TD62001 $R_{IN} = 0 \Omega$</p> <p>TD62002 $R_{IN} = 7 \text{ V Zener diode} + 10.5 \text{ k}\Omega$</p> <p>ULN2003/TD62003 $R_{IN} = 2.7 \text{ k}\Omega$</p> <p>ULN2004/TD62004 $R_{IN} = 10.5 \text{ k}\Omega$</p> 	DIP16
TD62002P							
TD62003P							
TD62004P							
TD62001AP							
TD62002AP							
ULN2003AP★		50					SOL16
TD62003AP							
ULN2004AP★							
TD62004AP							
ULN2003AFW★							
ULN2004AFW★		35/50					SOP16
TD62001F/AF							
TD62002F/AF							
TD62003F/AF							
TD62003FB							
TD62004F/AF							
TD62004FB							
TD62006P	6-ch Darlington sink drivers	22	150	○			DIP14
TD62006F							
TD62007P	7-ch Darlington sink drivers	22	150	○			DIP16
TD62007F							
TD62008AP		50	400	○			DIP16
TD62008F/AF		35/50					

★: New product

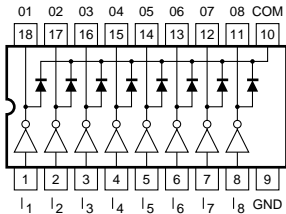
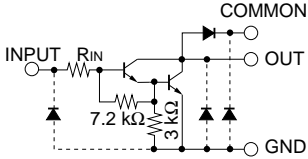
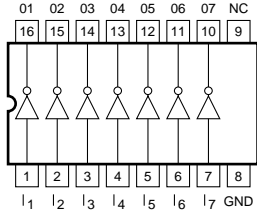
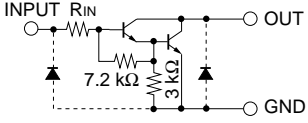
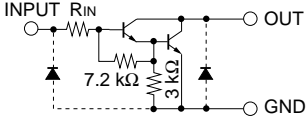
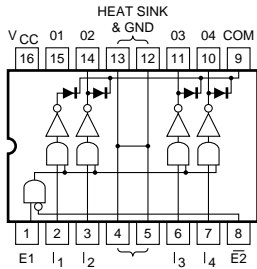
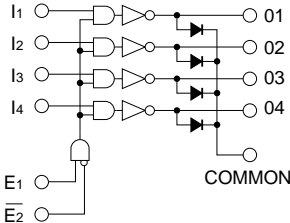
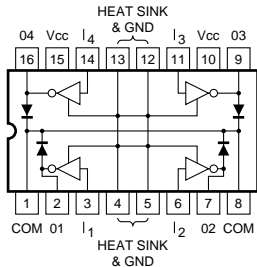
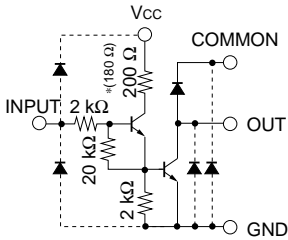


Monolithic Transistor Arrays

Bipolar Transistor Arrays (2)

Device	Function	Rating			Pin connections	Equivalent circuit	Package
		V _{OUT} (V)	I _{OUT} (mA)	Clamp diode			
TD62064P	4-ch high-current Darlington sink drivers	35	1500	○			DIP16
TD62064AP/APA		50			HSOP16		
TD62064BP-1		80					
TD62064F/AF		35/50					HSOP16
TD62064BF		80					
TD62074P		35			—		
TD62074AP	50	HSOP16					
TD62074F/AF	35/50						
TD62081AP	8-ch Darlington sink drivers	50	500	○			DIP18
TD62082AP							
ULN2803AP★							
TD62083AP							
ULN2804AP★							
TD62084AP							

Bipolar Transistor Arrays (3)

Device	Function	Rating		Clamp diode	Pin connections	Equivalent circuit	Package			
		V _{OUT} (V)	I _{OUT} (mA)							
TD62081CP	8-ch Darlington sink drivers	100	400	○		 <p>TD62081 R_{IN} = 0 Ω TD62082 R_{IN} = 7 V Zener diode + 10.5 kΩ ULN2803/TD62083 R_{IN} = 2.7 kΩ ULN2804/TD62084 R_{IN} = 10.5 kΩ</p>	DIP18			
TD62082CP							SOP18			
TD62083CP							SOL18			
TD62084CP							SSOP18			
TD62081F/AF		35/50								
TD62082F/AF										
TD62083F/AF										
TD62084F/AF										
ULN2803AFW		50								
ULN2804AFW										
TD62083AFN										
TD62084AFN										
TD62101P	7-ch Darlington sink drivers	500	—	—			DIP16			
TD62103P										
TD62104P										
TD62105P		25						SOP16		
TD62101F										
TD62103F										
TD62104F										
TD62105F										
TD62107P	4-ch high-current Darlington sink drivers with enable	45	750	○			DIP16			
TD62107BP		80								
TD62107F		35								
TD62164AP	4-ch high-current Darlington sink drivers	50	700				DIP16			
TD62164BP		80								

※: TD62164BP

*: TD62164BP

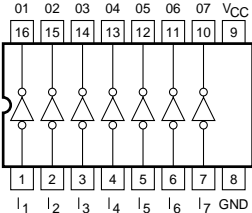
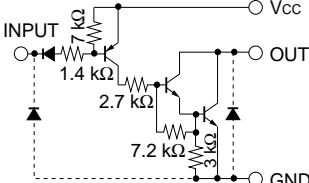
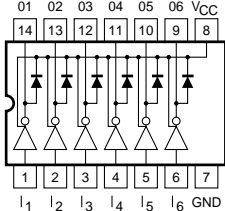
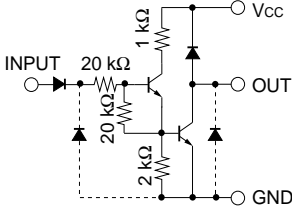
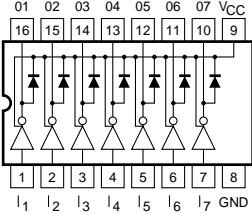
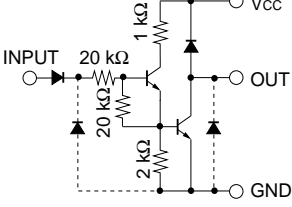
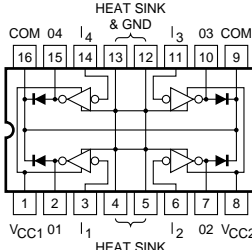
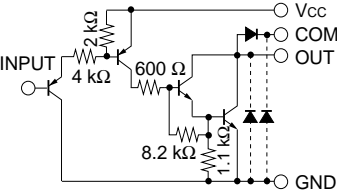
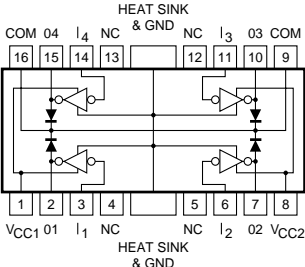


Monolithic Transistor Arrays

Bipolar Transistor Arrays (4)

Device	Function	Rating			Pin connections	Equivalent circuit	Package				
		V _{OUT} (V)	I _{OUT} (mA)	Clamp diode							
TD62164AF	4-ch high-current sink drivers	50	700	○			HSOP16				
TD62164BF		80									
TD62300P	2-ch low-voltage sink driver	8	200	—			DIP8				
TD62300F							SOP8				
TD62301P	7-ch Darlington sink drivers	15	200	○			DIP16				
TD62302P							SOP16				
TD62301F											
TD62302F											
TD62303P	6-ch low-saturation sink drivers	17	500	—			DIP16				
TD62303F							SOP16				
TD62304P	7-ch Low-active Darlington sink drivers	35	500	—			DIP16				
TD62304AP		50									
TD62304F/FB	7-ch Low-active Darlington sink drivers	35	50	—			SOP16				
TD62304AF							SSOP16				
TD62304AFN											

Bipolar Transistor Arrays (5)

Device	Function	Rating			Pin connections	Equivalent circuit	Package	
		V _{OUT} (V)	I _{OUT} (mA)	Clamp diode				
TD62305P	7-ch Low-active Darlington sink drivers	35	500	—			DIP16	
TD62305AP		50					SOP16	
TD62305F/FB/AF		35/50					SSOP16	
TD62305AFN		50						
TD62306P	6-ch low-saturation sink drivers	20	150	○			DIP14	
TD62306F							SOP14	
TD62307P	7-ch low-saturation sink drivers	20	150	○			DIP16	
TD62307F							SOP16	
TD62308AP/APA	4-ch Low-active high-current Darlington sink drivers	50	1500	○			DIP16	
TD62308BP-1		80						
TD62308F		35					HSOP16	
TD62308AF		50						
TD62308BF		80						



Monolithic Transistor Arrays

Bipolar Transistor Arrays (6)

Device	Function	Rating			Pin connections	Equivalent circuit	Package
		V _{OUT} (V)	I _{OUT} (mA)	Clamp diode			
TD62309P	6-ch low-saturation high-current sink drivers	20	700	○			DIP16
TD62309F							HSOP16
TD62318AP	4-ch Low-active high-current sink drivers	50	700	○			DIP16
TD62318BP		80					HSOP16
TD62318AF		50					
TD62318BF		80					
TD62380P	8-ch low-saturation sink drivers	15	120	—			DIP18

*: TD62318BP/BF

Bipolar Transistor Arrays (7)

Device	Function	Rating			Pin connections	Equivalent circuit	Package
		V _{OUT} (V)	I _{OUT} (mA)	Clamp diode			
TD62381P	8-ch low-saturation sink drivers	15	500	—			DIP18
TD62381F							SOP18
TD62381FN							SSOP18
TD62382AP	8-ch Low-active sink drivers	50	50	—			DIP18
TD62382F/AF		35/50					SOP18
TD62382AFN		50					SSOP18
TD62383P	8-ch Low-active sink drivers	10	500	○			DIP20
TD62384AP		50					DIP18
TD62384F/AF		35/50					SOP18
TD62385AP	8-ch Low-active sink drivers	50	500	—			DIP18
TD62385F/AF		35/50					SOP18
TD62386AP		50					DIP20
TD62386AF							SOP20

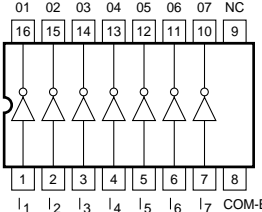
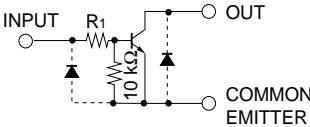
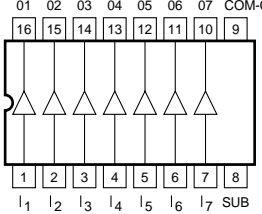
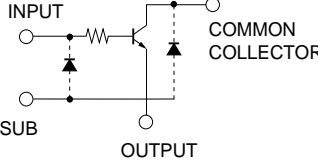
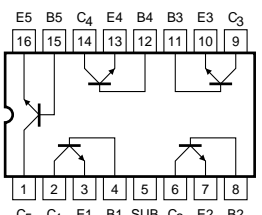
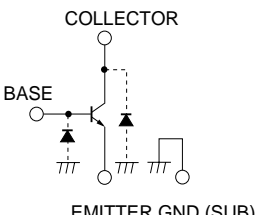
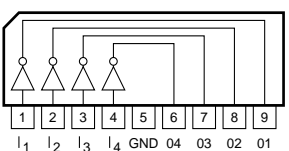
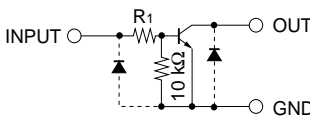
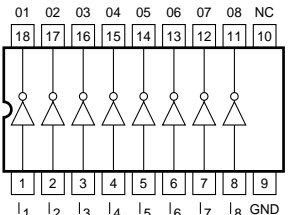
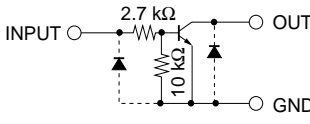
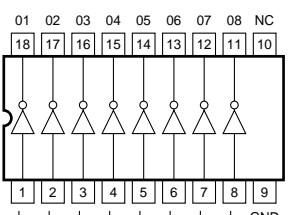
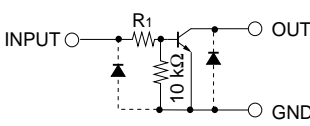


Monolithic Transistor Arrays

Bipolar Transistor Arrays (8)

Device	Function	Rating			Pin connections	Equivalent circuit	Package
		V _{OUT} (V)	I _{OUT} (mA)	Clamp diode			
TD62387AP	8-ch Low-active Darlington sink drivers	50	500				DIP20
TD62387AF							SOP20
TD62387AFN							SSOP20
TD62388AP							DIP20
TD62388AF							SOP20
TD62388AFN							SSOP20
TD62445FN	4-ch sink driver with over-current detection function	30	200				SSOP18
TD62476P	Dual-peripheral AND drivers	35	350	○			DIP8
TD62477P	Dual-peripheral NAND drivers						
TD62478P	Dual-peripheral OR drivers						
TD62479P	Dual-peripheral NOR drivers						

Bipolar Transistor Arrays (9)

Device	Function	Rating			Pin connections	Equivalent circuit	Package	
		V _{OUT} (V)	I _{OUT} (mA)	Clamp diode				
TD62501P	7-ch single drivers common emitter	35	200	—		 <p>TD62501 R_{IN} = 0 Ω TD62502 R_{IN} = 7 V Zener + 10.5 kΩ TD62503 R_{IN} = 2.7 kΩ TD62504 R_{IN} = 10.5 kΩ</p>	DIP16	
TD62502P							SOP16	
TD62503P/PA								
TD62504P/PA /P-H							SSOP16	
TD62501F								
TD62502F							SOP16	
TD62503F/FB								
TD62504F/FB							SSOP16	
TD62502FN								
TD62503FN							SSOP16	
TD62504FN								
TD62505P	7-ch single drivers common collector	35	200	—			DIP16	
TD62506P							SOP16	
TD62505F								
TD62506F							SOP16	
TD62507P	5-ch isolated drivers	35	200	—			DIP16	
TD62507F							SOP16	
TD62551S	4-ch single drivers common collector	25	150	—			SIP9	
TD62553S								
TD62554S								
TD62555S								
TD62583AP	8-ch single drivers	50	50	—			DIP18	
TD62583F/AF		35/50					SOP18	
TD62591AP		50	200				DIP18	
TD62592AP							SSOP18	
TD62593AP								
TD62594AP							SSOP18	
TD62593AFN								
TD62594AFN							SSOP18	
TD62594AFN								



Monolithic Transistor Arrays

Bipolar Transistor Arrays (10)

Device	Function	Rating			Pin connections	Equivalent circuit	Package
		V _{OUT} (V)	I _{OUT} (mA)	Clamp diode			
TD62595AP/AF	8-ch single drivers	50	200	○			DIP18 /SOP18
TD62596AP/AF							
TD62597AP/AF							
TD62598AP/AF							
TD62597AFN							SSOP18
TD62598AFN							
TD62601P	6-ch threshold free drivers (inverter)	20	10	—			DIP16
TD62602P							SOP16
TD62601F							
TD62602F							
TD62603P	6-ch threshold free drivers (non-inverter)						DIP16
TD62604P							SOP16
TD62603F							
TD62604F							
TD62703P	6-ch high-voltage source driver	60	-50	—			DIP14
TD62703F							SOP14
TD62705P							DIP16
TD62706P/P-H							SOP16
TD62705F							
TD62706F							
TD62706FA-H**							
TD62707AP	4-ch high-voltage source driver with enable	50	-700	○			DIP16

** : Under development

Bipolar Transistor Arrays (11)

Device	Function	Rating			Pin connections	Equivalent circuit	Package			
		V _{OUT} (V)	I _{OUT} (mA)	Clamp diode						
TD62708N	8-ch high-current source drivers	40	-1800	—			SDIP24			
TD62771AP	7-ch high-voltage source drivers	60					DIP16			
TD62781AP	8-ch high-voltage source drivers	35/50	-50	—			DIP18			
TD62782AP								SOP18		
TD62781F/AF										
TD62782F/AF										
TD62783AP/APA	8-ch high-voltage source drivers	50	-500	○			DIP18			
TD62784AP		35/50						SOP18		
TD62783F/AF								SSOP18		
TD62784F/AF										
TD62783AFN		50								
TD62784AFN										
TD62783AFW★										
TD62784AFW★										
TD62785P/F	8-ch source driver	7		—			DIP18/ SOP18			

★: New product



Monolithic Transistor Arrays

Bipolar Transistor Arrays (12)

Device	Function	Rating			Pin connections	Equivalent circuit	Package
		V _{OUT} (V)	I _{OUT} (mA)	Clamp diode			
TD62786AP	8-ch high-voltage source drivers	50	35/50			DIP18	
TD62786F/AF		35/50				SOP18	
TD62786AFN		50				SSOP18	
TD62787AP		35/50				DIP18	
TD62787F/AF		50				SOP18	
TD62921S	120-V 2-ch 3-state buffers	120	-10 +20	—			SIP9
TD62981P	120-V 8-ch 3-state buffers						DIP20

4-ch BF Series

80 V Devices in a new flat-package series

Application

Circuit	Application example of 4-phase unipolar stepping motor	
Drive	4-phase unipolar drive	2-phase bipolar drive
Features	High speed	High torque

TD62064BF, TD62164BF, TD62308BF and TD62318BF

The **TD62xxxBF** series are NPN transistor arrays each containing four circuits. This series incorporates an output clamp diode, which is used for clamping the electromotive counter-forces that occur when driving inductive loads, and an input resistor for limiting the transistor's base current.

Pay special attention to thermal conditions when using products of this series.

Features:

- Four circuits built in, BF designates, HSOP 16-pin
- High sustaining voltage output :
 $V_{CE(SUS)} = 80\text{ V (min)}$
- Large output current : $I_{OUT} = 700\text{ mA/ch (max)}$
(TD62164BF)
(TD62318BF)
 $I_{OUT} = 1500\text{ mA/ch (max)}$
(TD62064BF)
(TD62308BF)
- Built-in output clamp diode
- Built-in input resistor

Maximum rating ($T_a = 25^\circ\text{C}$)

Item	Symbol	Rating	Unit
Output sustaining voltage	$V_{CE(SUS)}$	-0.5 ~ 80	V
Parasitic transistor output sustaining voltage	$V_{CEF}(*1)$	80	V
Output current	I_{OUT}	1.5	A/ch
		0.7	
Input current	I_{IN}	50	mA
		10	
Input voltage	V_{IN}	7	V
		17	
Power Dissipation	P_D	0.9	W
		1.4(*2)	
Operating temperature	T_{opr}	-40 ~ 85	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 ~ 150	

*1: Parasitic transistor (COMMON-GND-OUTPUT) output voltage

*2: On fiberglass PCB (60 × 30 × 1.6 mm, Cu = 30%)

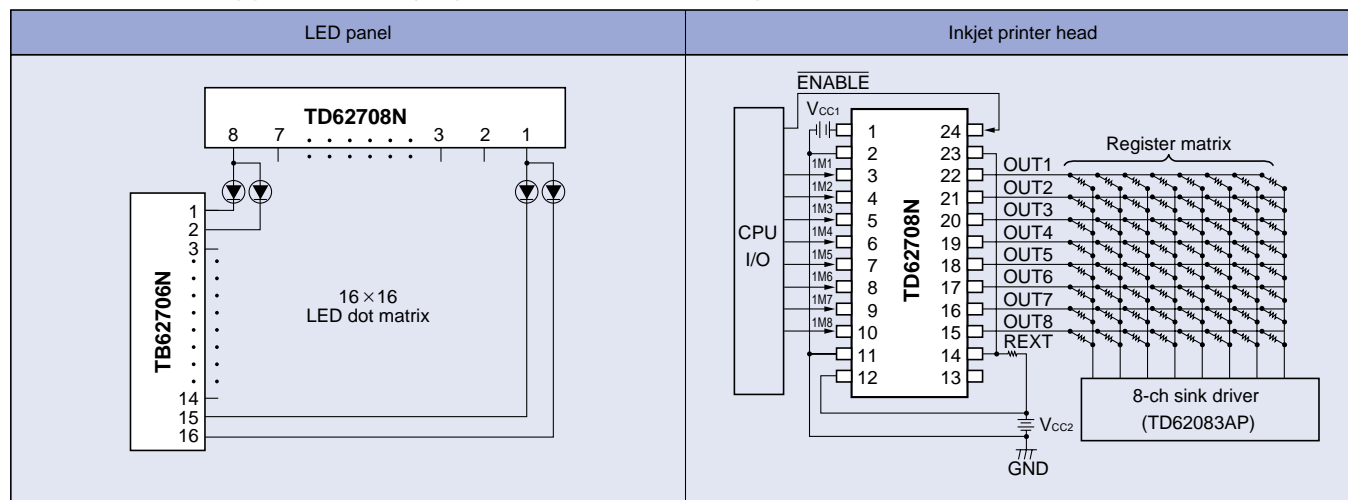


Monolithic Transistor Arrays

4-ch BF Series

TD62708N

Recommended Application: Inkjet printer heads and LED panels



High-Side Driver for Load Resistance

TD62708N

The **TD62708N** is comprised of eight source-current output stages and enable inputs which can control the gate outputs.

Its main feature are:

- Input terminal : High active
- Enable terminal : Low Input/Output active
- Output current : $I_{OUT} = -1.8 \text{ A (max)}$
- Little variation in output voltage : $\Delta V_{OH1} < 0.45 \text{ V (at } I_{OH} = 0.18 \text{ A to } 1.8 \text{ A)}$
- Package type : SDIP24 (shrink pitch)
- Input CMOS, TTL compatible

Maximum rating ($T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Rating	Unit
Supply voltage 1	V_{CC1}	-0.5 ~ 7.0	V
Supply voltage 2	V_{CC2}	-0.5 ~ 40	
Output current	I_{OUT}	-1.8*	A/ch
Input voltage	V_{IN}	-0.5 ~ 7.0	V
Input current	I_{IN}	± 4.0	mA
Power Dissipation	P_D	1.48	W
Junction temperature	T_j	150	$^\circ\text{C}$
Operating temperature	T_{opr}	-40 ~ 85	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 ~ 150	$^\circ\text{C}$

*: 1.8 A/ch (32 μs , Duty < 76%). Different channels should not be switched on at the same time.

Relay Driver with Overcurrent Detection Function

TD62445FN

The **TD62445FN** is a sink driver equipped with an overcurrent detection circuit. Current limit settings can be made in each of its four circuits.

The TD62445FN is equipped with an internal comparator that detects overcurrent by comparing the voltage generated by the output current in the external resistor with the standard reference voltage.

Overcurrent detection is performed by switching the ERR terminal in the open collector to ON. Once the ERR terminal has been set ON, the system should be configured so that the input signal is set to OFF status immediately.

Features:

● Compact SSOP package

The **TD62445FN** is packaged in an 18-pin SSOP with 0.65 mm pitch. Products are supplied only on embossed tape.

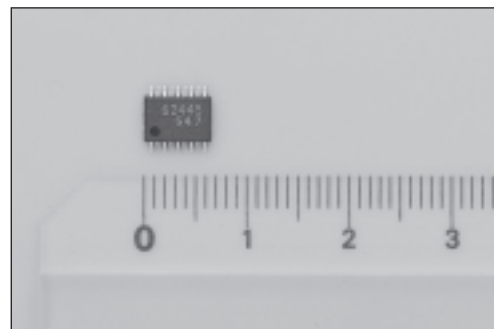
● Capability for monitoring overcurrent in each of the four circuits

Overcurrent detection can be set for each of the four circuits.

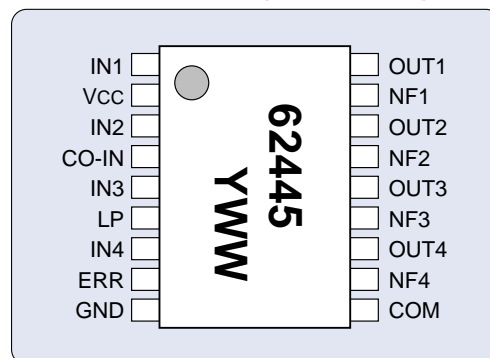
The overcurrent detection output signal is set at ON (Low level) when an overcurrent flows in any of these four circuits.

Because the output current is not switched off automatically, the system should be configured so that this signal is set at OFF when the input signal or CO-IN signal reaches the Low level.

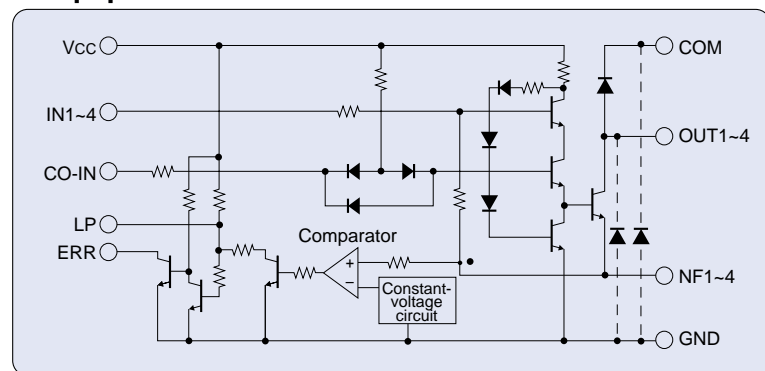
■ Package (SSOP18-P-225-0.65)



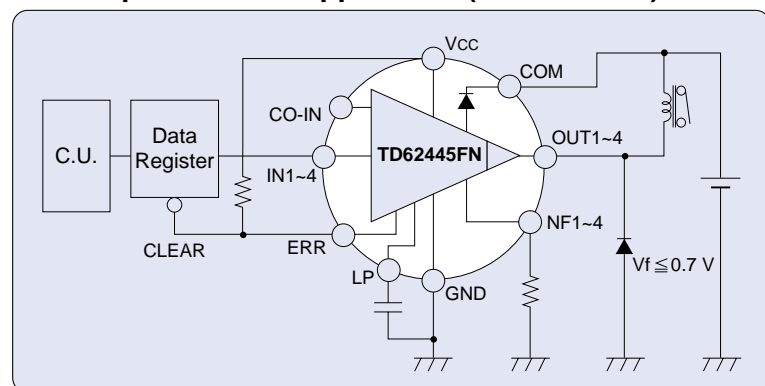
■ Pin connection (TOP VIEW)



■ Equipment circuit



■ Example of circuit application (TD62445FN)



Comments:

● High-precision overcurrent countermeasures

Overcurrent countermeasures for a Toshiba driver IC in its entirety, and for each of its circuits, are performed from an external resistor. This enables attainment of high levels of circuit safety, and is an inexpensive method of control.

● Sensitivity regulated by an external condenser

The LP terminal is used for passing comparator output through to a low-pass filter. It is possible to modify the sensitivity of the ERR terminal simply by changing the capacitance. For example, this will prevent spurious ERR detection caused by the rush current of a lamp.

● Output ratings (max)

Output current : 200 mA (per 1 circuit)

Output sustain-
ing voltage : 30 V (OUT1 to 4 terminals)
: 7 V (ERR terminal and each
input terminal)
: 1 V (NF terminal)

Supply voltage : 7 V (Vcc terminal)



Monolithic Transistor Arrays

Devices Comprising 5 V Power Supply and Supply Voltage Monitoring Function, plus Telecommunications IC, for Vending Machines

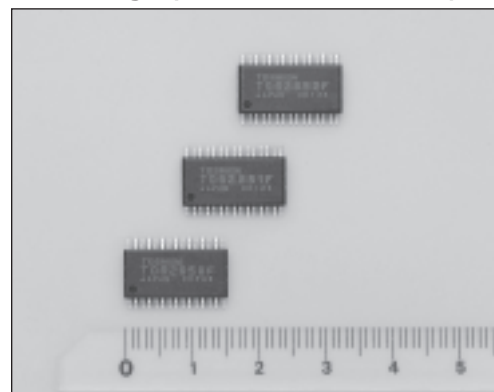
TD62650F, TD62651F and TD62652F

The **TD6265xF** series has been designed for microcomputer systems in vending machines, and these devices capable of providing 5 ± 0.5 V of output voltage without any adjustment, which otherwise would have to be done by an additional high-precision reference voltage power supply and amplifier circuit.

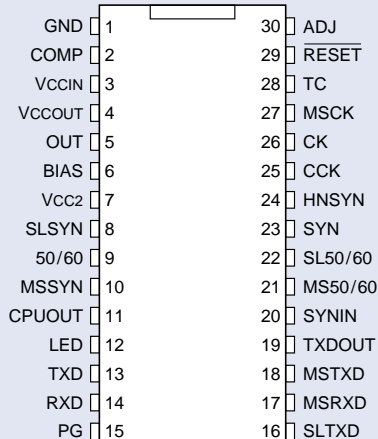
Further, the **TD6265xF** series is capable of resetting a system by transmitting a reset signal when the power source is turned ON. It also transmits a reset signal if disturbance causes the 5 V output voltage to drop below 92% (**TD62650F/652F**) or 85% (**TD62651F**) of its prescribed level. In addition to this, a watchdog timer capable of system diagnosis has been incorporated, which prevents system runaway by generating a reset pulse intermittently during system malfunctions.

The interface circuit includes three serial ports for a standard 24 V/4800 bps connection from the microcomputer system.

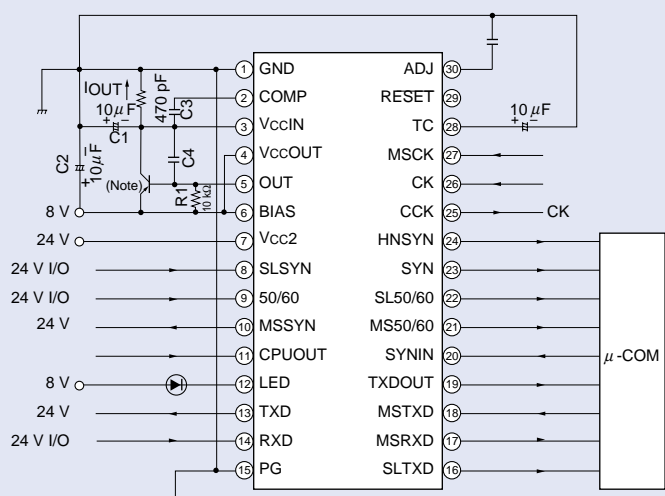
■ Package (SSOP30-P-375-1.00)



■ Pin connection (TOP VIEW)



■ Example of circuit application



Note: External PNP transistor (not required when the built-in Transistor is to be used.)

■ Primary specifications

Product name	TD62650F	TD62651F	TD62652F
Supply voltage	5 V \pm 5%		
Current capacitance	-300 mA (max) built-in		
Reset detection voltage	92% accuracy at 5 V	85% accuracy at 5 V	92% accuracy at 5 V
System reset function	Power-on reset timer, watchdog timer		
Resistor for setting up timer	Built-in	External	External
Package	30-pin, 375 mil width, SSOP (1 mm pitch)		

3-ch Small Signal IGBT Gate Driver

TD62930P/F

The **TD62930P/F** is a driver that outputs 5 V the signal required to drive an IGBT gate through the input of a signal. This is especially suitable for driving the compact low-side IGBTs commonly used in inverters for household electric appliances.

The timing for controlling the ON and OFF signals for IGBT gates is a simple procedure as the output is separated for the high-side and low-side.

Two output signals are assigned for each input signal. The high-side outputs high-level and high-impedance signals in response to the high-level or low-level input signals, and the low-side outputs high-impedance and low-level signals.

Features:

● Supply voltage (maximum ratings)

Supply voltage for high-voltage areas : $V_{CC} = 30 \text{ V}$

Supply voltage for low-voltage areas : $V_{DD} = 7 \text{ V}$

● Output current (maximum ratings)

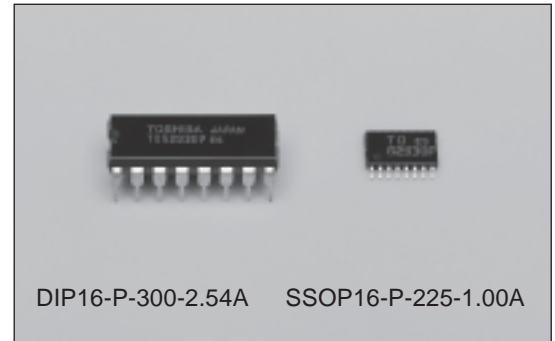
High-side peak current : $I_{OUT} = -0.1 \text{ A (min)}$

Low-side peak current : $I_{OUT} = 0.1 \text{ A (min)}$

● I/O response speed: $t_{pHL}, t_{pLH} < 1 \mu\text{s (max)}$

● Package: DIP16/SSOP

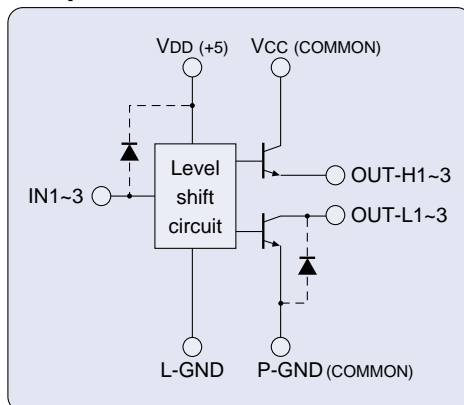
■ Package (SSOP30-P-375-1.00)



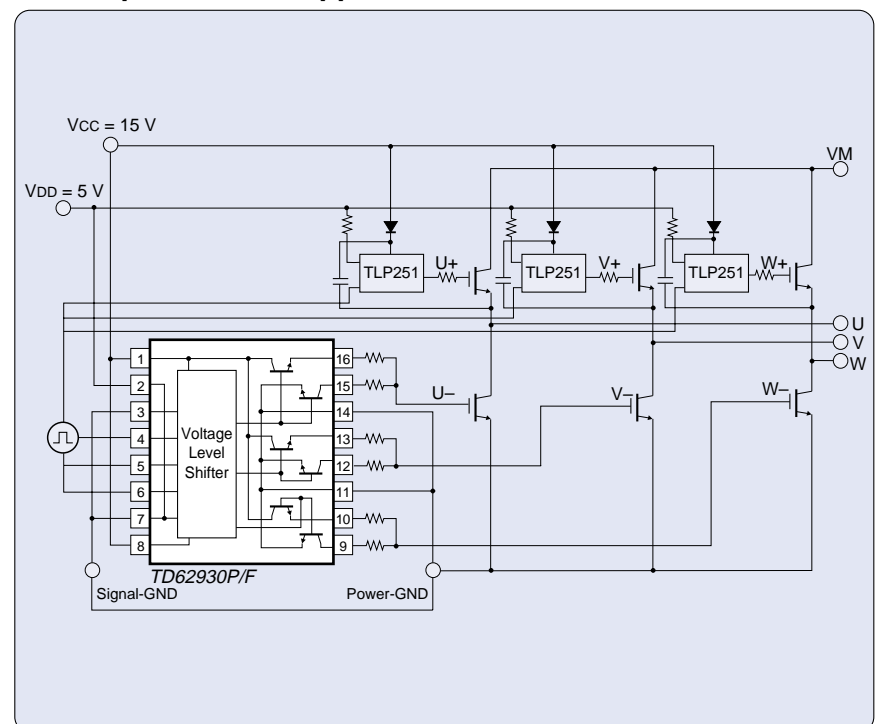
■ Pin connection (TOP VIEW)

V_{CC}	1	16	OUT-H1
V_{DD}	2	15	OUT-L1
L-GND	3	14	P-GND
IN1	4	13	OUT-H2
IN2	5	12	OUT-L2
IN3	6	11	P-GND
L-GND	7	10	OUT-H3
V_{CC}	8	9	OUT-L3

■ Equivalent internal circuit



■ Example of circuit application





Multi-Chip Package (MCP)

■ A new style of integrated technology that utilizes multiple semiconductor chips drawn from among the existing devices in our product line.

Multi-chip packages include multiple LSIs or discrete semiconductor chips in their lead frame. The connections between elements are made by bonding wires through the lead frame or circuit board, and the resulting assembly is then packaged into standard LSIs by transfer molding. This method ensures that the reliability of the package is the same as that of conventional monolithic ICs.

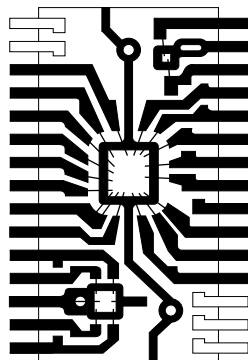
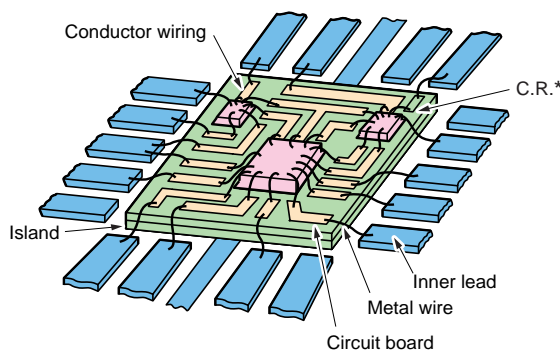
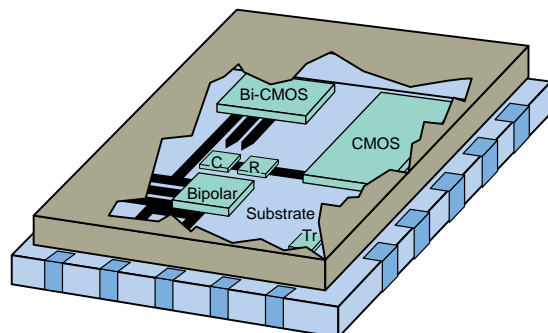
This technology can be used with existing LS assembly line and test processes to enable the manufacture of products at less cost than hybrid ICs.

In addition to this, as existing LSI or discrete semi-conductor elements can be used, this technology is ideal for providing ICs that operate perfectly, with less development risk.

Multi-Chip Package Technology

Toshiba multi-chip package technology can be largely split into three different types: normal type; high-density type, and Micro Assembly System Technology (MAST) type.

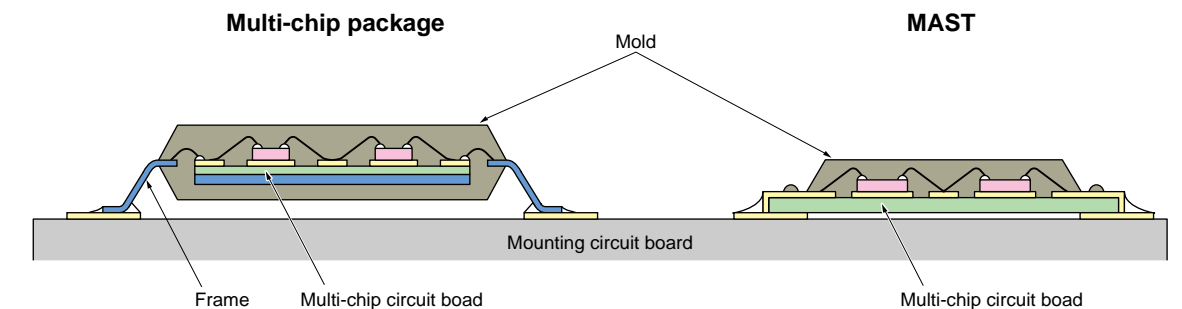
☆: Level of technological advancement

Concept			Mounted area	Number of components	Structure
Type					
Multi-chip-package	Normal type	Entails simple incorporation of multiple chips in a single package.	☆	☆	
	High-density type	Interactive connections between chips are made by mounting circuit substrates on top of lead frame islands.	☆☆	☆☆	
MAST		A chip is mounted on a circuit board. A leadless chip carrier (LCC) package is molded only on one side.	☆☆☆	☆☆☆☆	

* C: Condenser, R: Resistor

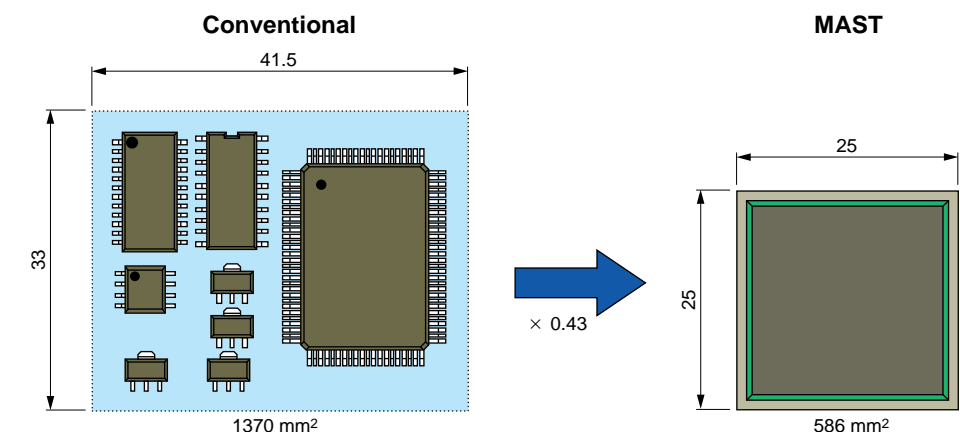
Example of Multi-Chip mounting

Toshiba's multi-chip package technology has enabled high-density mounting as shown in the diagram.



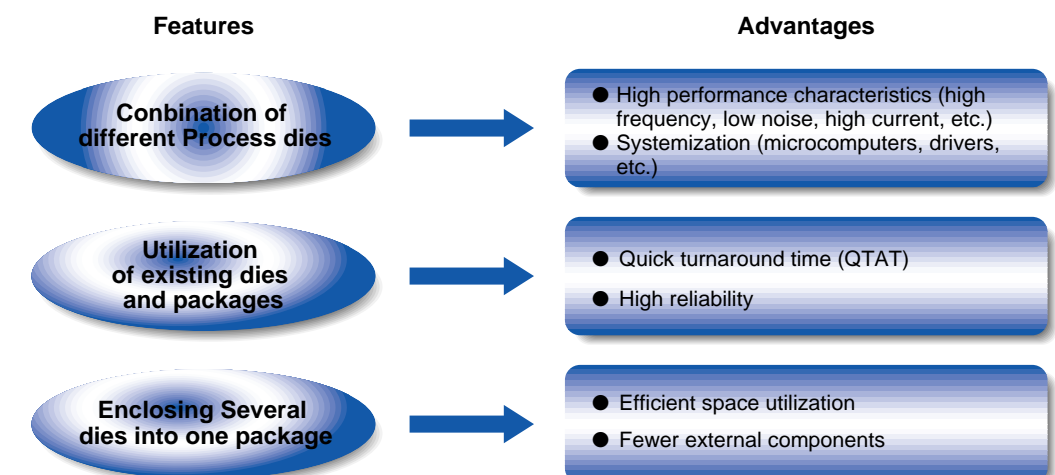
Example of MAST integration

Use of MAST requires approximately half of the area required for conventional products (in comparison with other Toshiba products).



Features of Multi-Chip packages

Toshiba's multi-chip package technology incorporates the following features:





Multi-Chip Transistor Arrays

Multi-Chip Transistor Arrays (1)

Product number	Function	Internal chips	Rating		Pin assignment	Equivalent circuit	Package
			V _{OUT} (V)	I _{OUT} (A)			
TD62M4700F	Ultra low-saturation voltage H-bridge driver	RN6006 × 2 RN5006 × 2	10	±2			SSOP16
TD62M2701F	Ultra low-saturation voltage H-bridge driver	2SA1314 × 2 RN5006 × 2	10	±2			SSOP16
TD62M2702F	Ultra low saturation voltage H-bridge driver	RN6006 × 2 2SC2982 × 2 U1FWJ49 × 2	10	±2			SSOP16
TD62M3600F	3-ch source driver	RN6006 × 3	10	±2			SSOP10
TD62M3601F	3-ch source driver	2SA1203 × 3	30	-1.5			SSOP10

Multi-Chip Transistor Arrays (2)

Product number	Function	Internal chips	Rating		Pin assignment	Equivalent circuit	Package
			V _{OUT} (V)	I _{OUT} (A)			
TD62M3700F	3-ch push-pull driver	2SA1203 × 3 2SC2883 × 3	30	±1.5			SSOP16
TD62M3701F	3-ch push-pull driver	RN6006 × 3 RN5006 × 3	10	±2			SSOP16
TD62M3702F	3-ch push-pull driver	2SA1314 × 3 2SC2982 × 3	15	±2			SSOP16
TD62M3704F	3-ch push-pull driver	RN5006 2SC3420	10	+5			SSOP16
		2SA1357 RN6006 2SA1314		-2			
TD62M4500F	4-ch sink driver	RN5006 × 4	10	2			SSOP16



Multi-Chip Transistor Arrays

Multi-Chip Transistor Arrays (3)

Product number	Function	Internal chips	Rating		Pin assignment	Equivalent circuit	Package
			V _{OUT} (V)	I _{OUT} (A)			
TD62M4501F	4-ch sink driver	2SC2982 × 4	20	2			SSOP16
TD62M4503AFN	4-ch sink driver	2SK1078 × 4 1SS184 × 1	60	0.8	<p>*1: 1SOURCE *2: 2SOURCE *3: 3SOURCE *4: 4SOURCE *5: ANODE 1</p>		SSOP24
TD62M4600F	4-ch source driver	RN6006 × 4	10	-2			SSOP16
TD62M4601F	4-ch source driver	2SA1357 × 4	20	-2			SSOP16
TD62M8500F	8-ch sink driver	RN5006 × 8	10	2			HSOP16

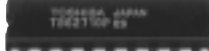
Multi-Chip Transistor Arrays (4)

Product number	Function	Internal chips	Rating		Pin assignment	Equivalent circuit	Package
			V _{OUT} (V)	I _{OUT} (A)			
TD62M8501F	8-ch sinkdriver	2SC3420 × 8	20	2			HSOP16
TD62M8600F	8-ch source driver	RN6006 × 8	10	−2			HSOP16
TD62M8601F	8-ch source driver	2SA1357 × 8	20	−2			HSOP16
TD62M8603F	8-ch source driver	2SA1203 × 8	30	−1.5			HSOP16
TD62M8604AF	8-ch source driver	2SA1680 × 8	50	−2			HSOP16



Intelligent Drivers

The intelligent driver series mainly consists of Application Specific Standard Product (ASSP) products that use Bi-CMOS processes. We have now expanded this IC product line by adding the TB627xx series of LED panel drivers and the **TB62600F** Thermal Printing Head (TPH) driver.



TB62705CFN

TB62705CF

TB62706BF

TB62706BN

TB62710P

TB62708N

TB62200AF

Intelligent Driver Series (1)

Product number	Function (application)	Output sustain voltage (V)	Output current (mA/bit)	Operating frequency (MHz)	Simple block diagram (package)
TB62701AN	16-bit SIPO shift register Latch driver Constant-current driver (LED, LED display)	30	50	2.0	<p> TB62701AN: +30 V / +50 mA n = 16 TB62705CP/CF/CFN: +17 V / +90 mA n = 8 TB62706BN/BF: +17 V / +90 mA n = 16 </p> <p> Package: SDIP24 (TB62701AN/TB62706BN) SSOP24 (1.0-mm pitch) (TB62706BF) DIP16 (TB62705CP) SSOP16 (1.0-mm pitch) (TB62705CF) SSOP16 (0.65-mm pitch) (TB62705CFN) </p>
TB62705CP /CF/CFN	8-bit SIPO Shift register Latch driver Constant-current driver (LED, LED display)	17	90	10.0	
TB62706BN /BF	16-bit SIPO Shift register Latch driver Constant-current driver (LED, LED display)	17	90	10.0	
TB62707F	8-bit PIPO Latch driver Constant-current driver (LED, LED display)	17	90	—	<p>TB62707F: +17 V / +90 mA n = 8</p> <p>Package: SSOP24</p>

Intelligent Driver Series (2)

Product number	Function (application)	Output sustain voltage (V)	Output current (mA/bit)	Operating frequency (MHz)	Simple block diagram (package)
TB62708N	16-bit SIPO Shift register Latch driver Constant-current source driver (LED, LED display)	17	-90	10	<p>TB62708N: 17 V / -90 mA</p> <p>Package: Shrink DIP30</p>
TB62709N/F	4-character, 7-segment display decoder & driver (LED, LED display)	17	40	10	<p>Package: SDIP24 SSOP24 (1.0-mm pitch)</p>
★TB62710P/F /FN	8-bit SIPO Shift register Latch driver Constant-current source driver (LED, LED display)	17	-90	10	<p>TB62710P/F/FN: 17 V / -90 mA</p> <p>Package: DIP20/SSOP24 (1.0 mm)/SSOP20 (0.65 mm)</p>
TB62713N/F	7 × 5 dot display decoder & driver (LED, LED display)	17	50	10	<p>Package: SDIP24 SSOP24 (1.0-mm pitch)</p>

★: New products



Intelligent Drivers

Intelligent Driver Series (3)

Product number	Function (application)	Output sustain voltage (V)	Output current (mA/bit)	Operating frequency (MHz)	Simple block diagram (package)
★TB62715FN	8-bit SIPO Shift register Latch driver Constant-current source driver (LED, LED display)	17	150	10.0	<p>TB62715FN: 17 V / 150 mA</p> <p>Package: SSOP24 (0.65 mm pitch)</p>
★★TB62716F	16-bit SIPO Shift register Latch driver Constant-current source driver (LED, LED display)	17	150	10.0	<p>TB62716F: 17 V / 150 mA</p> <p>Package: HSOP36 (0.65 mm pitch)</p>
★TB62717N/F	24-bit SIPO Shift register Latch driver Constant-current source driver (LED, LED display)	17	50	10.0	<p>TB62717N/F: 17 V / 50 mA</p> <p>Package: Shrink DIP42 pin / QFP48 (0.8 mm pitch)</p>

★: New product ★★: Under development

Intelligent Driver Series (4)

Product number	Function (application)	Output sustain voltage (V)	Output current (mA/bit)	Operating frequency (MHz)	Simple block diagram (package)
TD62801P/F	8-bit SIPO Shift register Latch driver (Thermal head, LED)	26	70	0.5	<p>TD62801P,TD62801F: 26 V / 70 mA</p> <p>Package: DIP16/HSOP16</p>
TD62824P	24-bit SIPO Shift register Latch driver (Thermal head, LED & LED display)	30	80	0.75	<p>TD62824P: +30 V / +80 mA</p> <p>Package: DIP20</p>



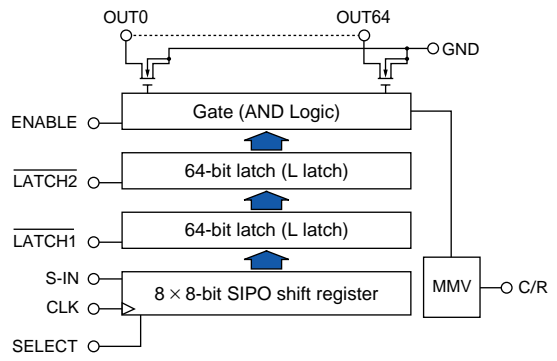
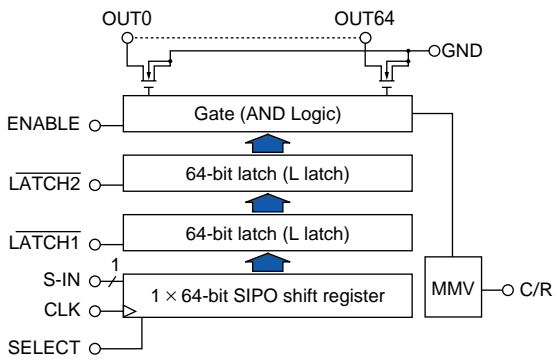
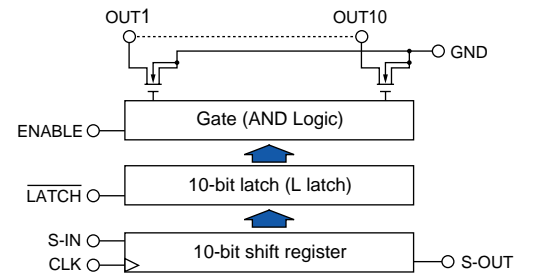
Intelligent Drivers

Intelligent Driver Series (5)

Product number	Function (application)	Output sustain voltage (V)	Output current (mA/bit)	Operating frequency (MHz)	Simple block diagram (package)
TD62C851P ★★TD62C851F	8-bit SIPO Shift register Latch driver (Thermal head, LED & stepping motor)	50	200	1.5	<p>TD62C851P / F: 50 V / 200 mA TD62C852P / F: 50 V / 500 mA</p> <p>Package: DIP20 SSOP24 (1.0 mm)</p>
TD62C852P ★★TD62C852F	8-bit SIPO Shift register Latch driver (Thermal head, LED & stepping motor)	50	500	1.5	<p>TD62C805F: 30 V / 100 mA</p> <p>Package: QFP80 (four-directional)</p>
TD62C805F	48-bit (8 × 6) Shift register Latch driver (Thermal head, LED)	30	100	5.0	<p>TD62C805F: 30 V / 100 mA</p> <p>Package: QFP80 (four-directional)</p>

★★ : Under development

Intelligent Driver Series (6)

Product number	Function (application)	Output sustain voltage (V)	Output current (mA/bit)	Operating frequency (MHz)	Simple block diagram (package)
TB62600F	64-bit (8 × 8) Shift register Latch driver (Thermal head, LED display)	30	130	10.0	<p>TB62600F: 30 V / 130 mA for SELECT terminal "H"</p>  <p>Package: QFP100 (QUAD)</p>
	64-bit (1 × 64) Shift register Latch driver (Thermal head, LED display)	17	90	10.0	<p>TB62600F: 30 V / 130 mA for SELECT terminal "L"</p>  <p>Package: QFP100 (QUAD)</p>
TB62702P/F	10-bit SIPO Shift register Latch driver (Thermal head, LED & LED display)	30	30	6.0	<p>TB62702P, TB62702F: 30 V / 30 mA</p>  <p>Package: DIP20 / SOP20</p>



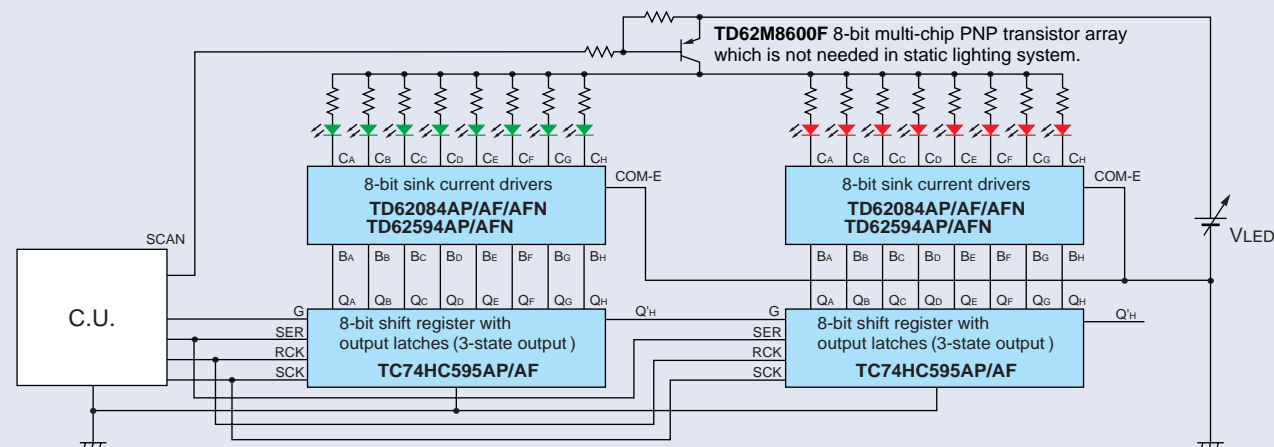
Intelligent Drivers

Application Examples

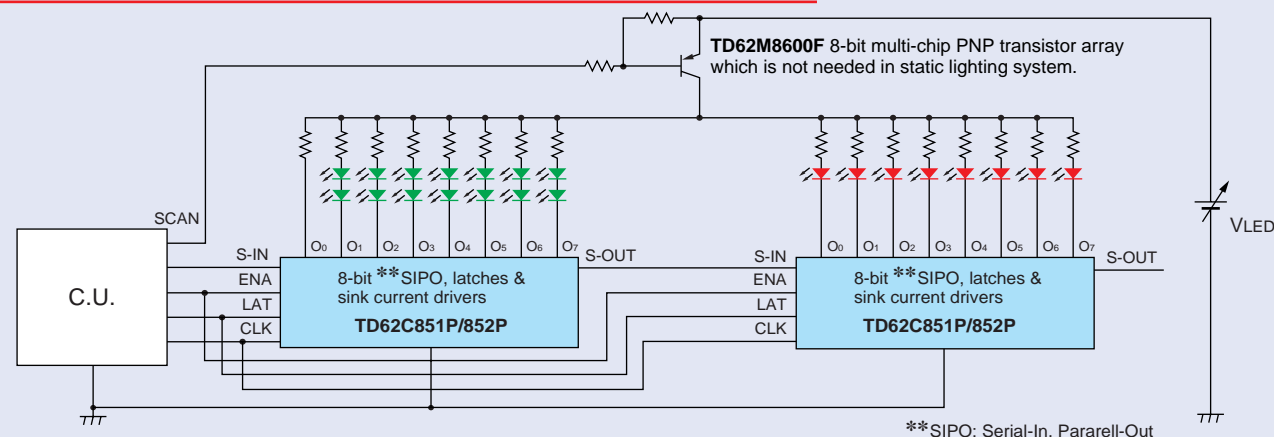
The **TB62701AN** series consists of 8 or 16-bit shift register latch drivers. Also, the use of a constant-current output eliminates the need for external resistors to be connected to each LED.

All output currents are stabilized by the resistance provided through the connection of a single IC (R-EXT terminal). A distinctive feature of the constant-current output design is that it assures the supply of an 0.4 V potential between GND and output, even in the worst conditions. In this way, the current value is kept stable even if the V_{LED} varies, so that unevenness of the luminance will be minimal and the LED can be driven efficiently.

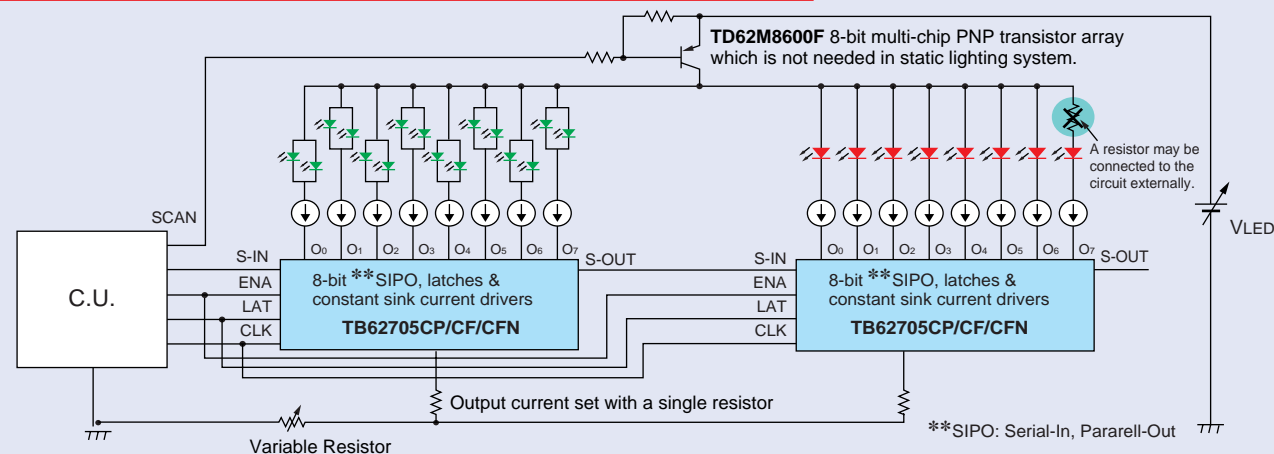
Example of LED Lighting Circuit using CMOS ICs and Bipolar ICs



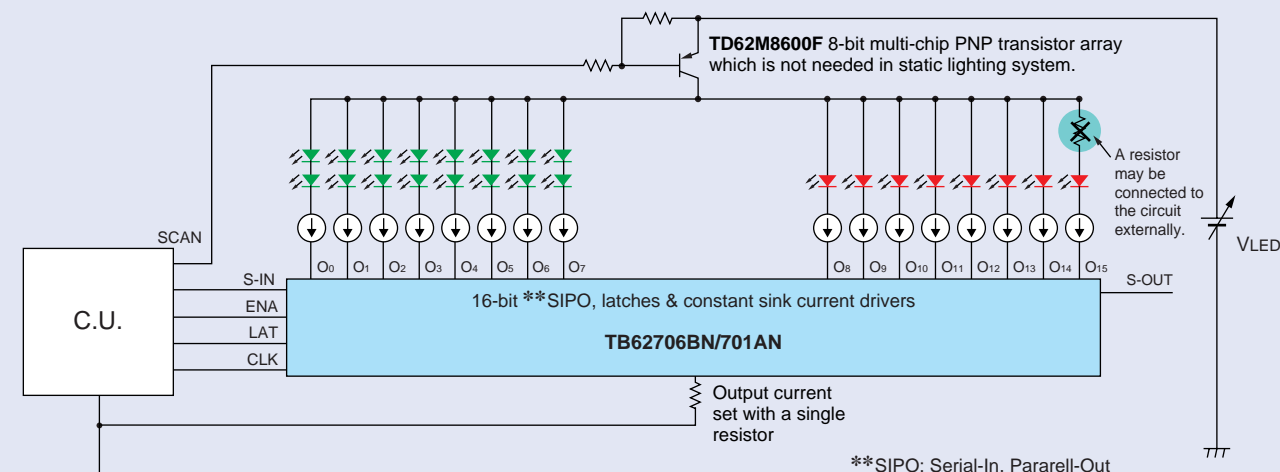
Example of LED Lighting Circuit using 8-Bit Constant-Voltage Driver ICs



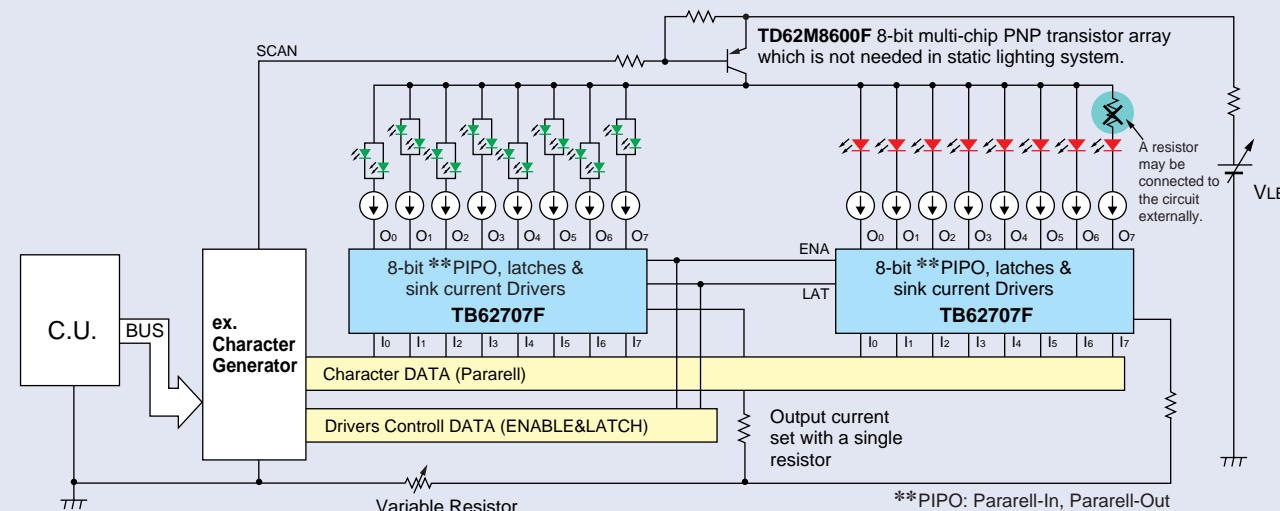
Example of LED Lighting Circuit using 8-Bit Constant-Current Driver ICs



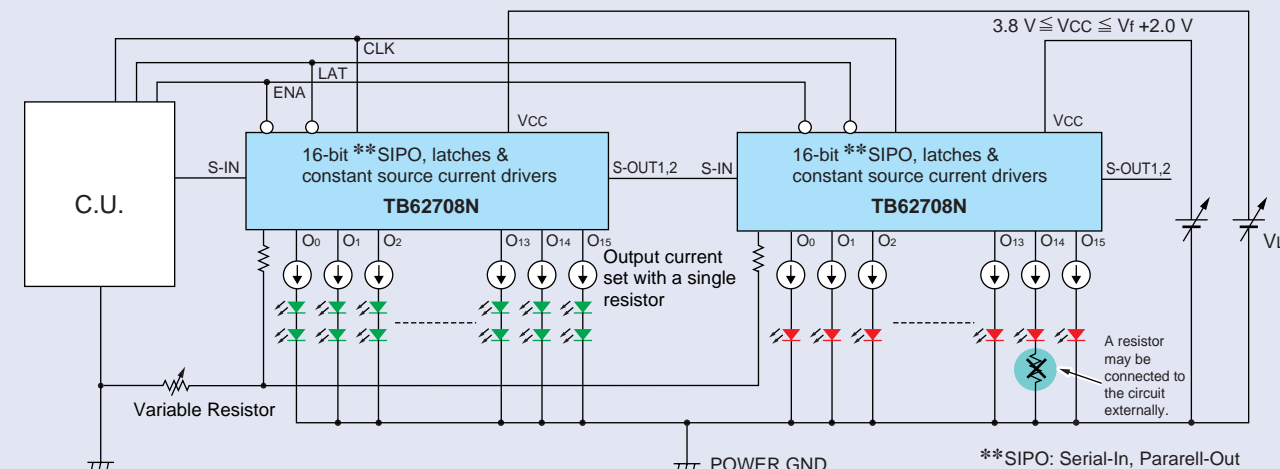
Example of LED Lighting Circuit using 16-Bit Constant-Current Driver ICs

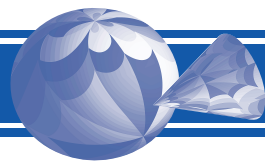


Example of LED Lighting Circuit using 8-Bit Constant-Current Driver ICs (parallel input)

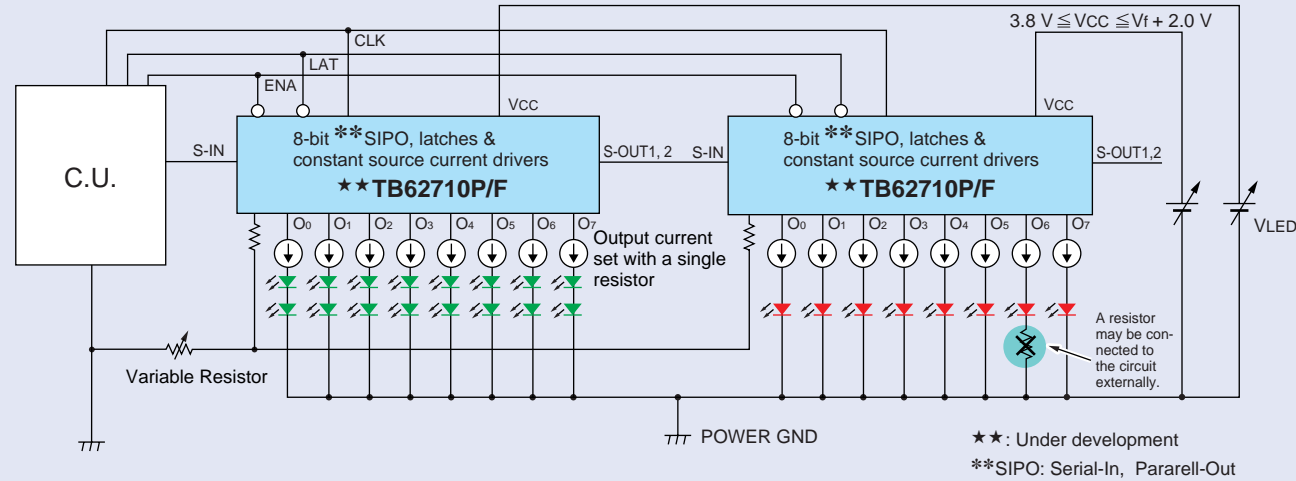


Example of LED Lighting Circuit using 16-Bit Constant-Current source Driver ICs

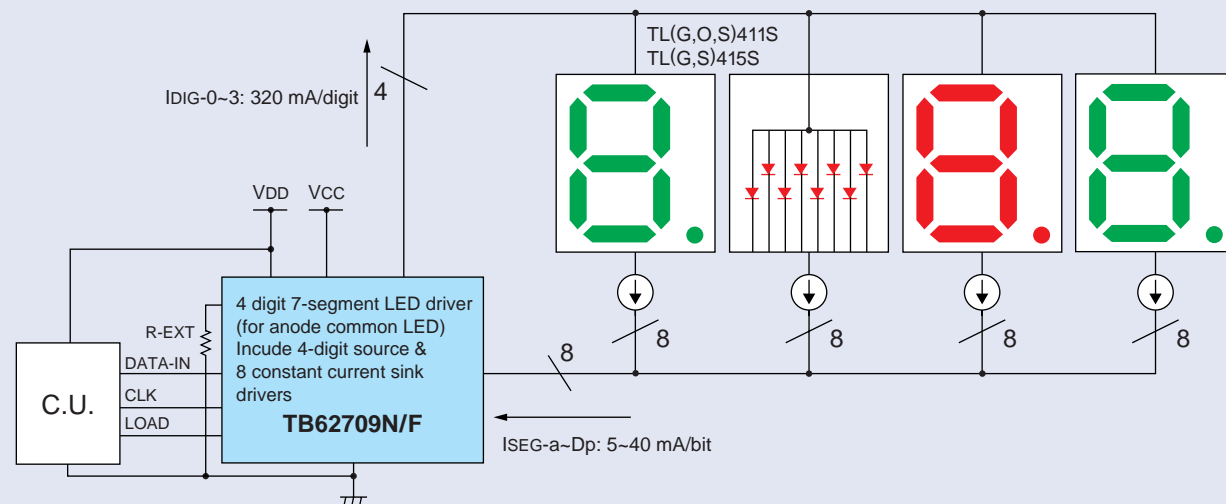




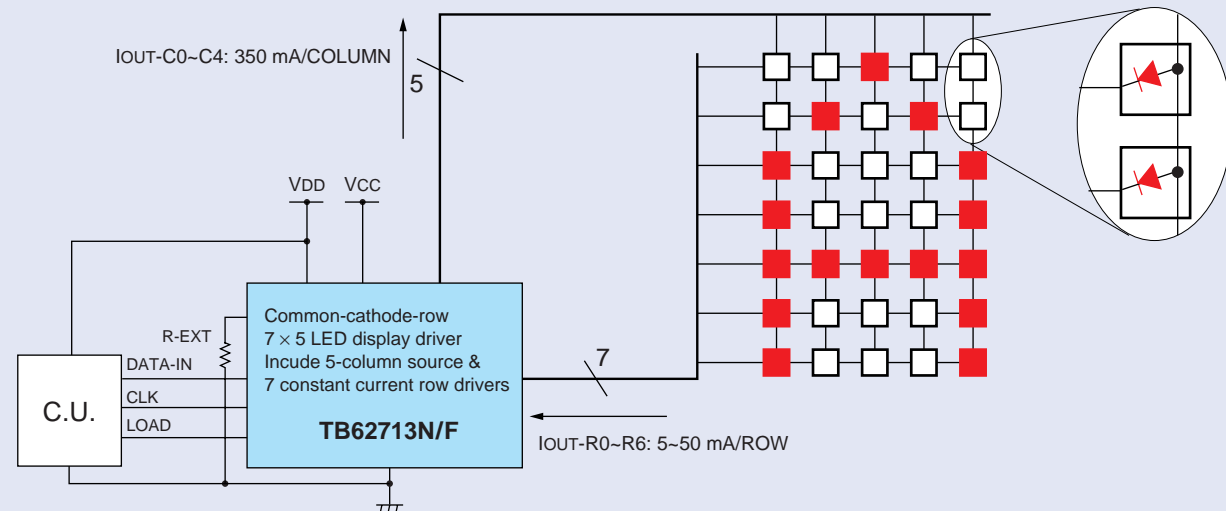
■ Example of LED Lighting Circuit using 8-Bit Constant-Current Source Driver ICs



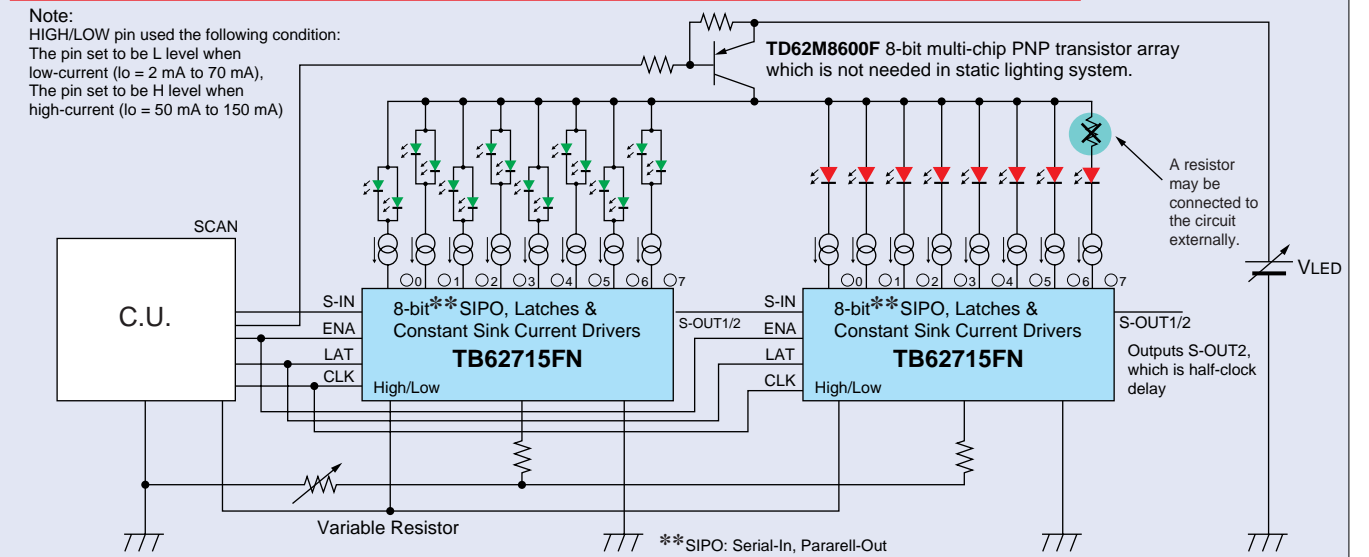
■ Example of Dynamic Lighting Circuit for 7-Segment Displays



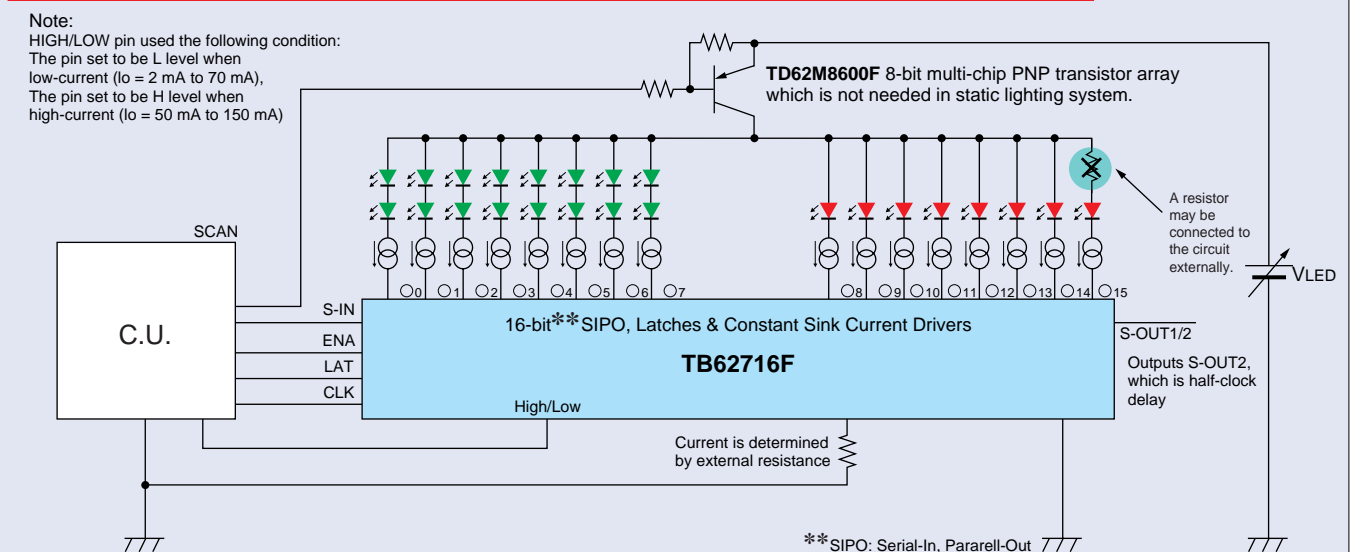
■ Example of Dynamic Lighting Circuit for 7 × 5 Dot Displays



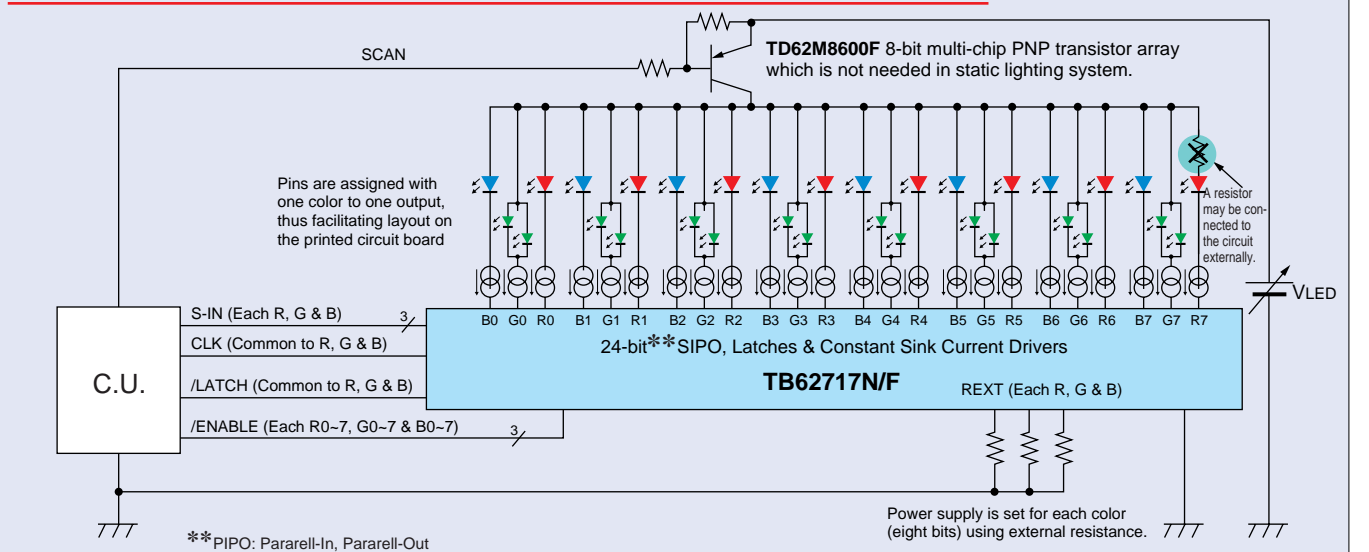
■ Example of LED Lighting Circuit using 8-Bit Constant-Current Driver ICs (large current type)



■ Example of LED Lighting Circuit using 16-Bit Constant-Current Driver ICs (large current type)



■ Example of LED Full-Color Lighting Circuit using 24-Bit Constant-Current Driver ICs










Intelligent Drivers

Primary Specifications of Constant-Current LED Drivers

Product	Features	Applicable LED	Data transfer frequency (MHz)	Output rating (V/ch, mA/ch)	Recommended output current (mA/BIT)	Constant-current skew (%per BIT / %per IC)
TB62701AN		anode common	2.0	30 / +50	40	±7.0 / ±15.0
TB62705CP/CF/CFN		anode common	10	17 / +90	72	±6.0 / ±15.0
TB62706BN/BF		anode common	10	17 / +90	72	±6.0 / ±15.0
TB62707F		anode common	—	17 / +90	72	±6.0 / ±15.0
TB62708N		cathode common	10	17 / -90	-72	±6.0 / ±15.0
TB62709N/F		anode common	10	17 / +40	32	±7.0 / ±15.0
★ TB62710P/F		cathode common	10	17 / -90	-72	±6.0 / ±15.0
TB62713N/F		common cathode row	10	17 / +50	40	±7.0 / ±15.0
★ TB62715FN		anode common	10	17 / +150	130	±6.0 / ±15.0
★★ TB62716F		anode common	10	17 / +150	130	±6.0 / ±15.0
★ TB62717N/F		anode common	10	17 / +50	40	±6.0 / ±15.0

★: New product ★★: Under development

Comparison of LED Modules and LED Displays

Conditions	Indoor	Indoor and outdoor	Indoor and outdoor	Indoor and outdoor	Outdoor
LED panel screen dimensions (Unit: Module/Display)	1 to 8 	1 to 16 	4 to 128 	4 to 128 	4 to 32 
(Display resolution)		(Fine)	(Very fine)	(Very fine)	(Fine)
Forward current for LED (Unit: mA/ch)	5 to 50	5 to 50	5 to 50	5 to 50	5 to 200
LED size, mm	LED Chip-ø3	ø3 ~ ø5	ø5 ~ ø10	ø5 ~ ø10	Dot Module
LED module screen dimensions (Unit: mm)	30×30 to 120×120	120×120 to 160×160	120×120 to 240×240	120×120 to 240×240	500×500 to 1000×1000
Emitted light color	Red, Green (Orange)	Red, Green (Orange)	Red, Green (Orange)	Red, Green, Blue (Full Colors)	Red, Green (Orange)
Number of LED drivers used (Unit: pcs/module. Module: 16×16 dots)	4 pcs (8-bit IC) 2 pcs (16-bit IC)	4 pcs ~ 64 pcs (8-bit IC) 2 pcs ~ 32 pcs (16-bit IC)	64 pcs (8-bit IC) 32 pcs (16-bit IC)	96 pcs (8-bit IC) 48 pcs (16-bit IC)	64 pcs (8-bit IC) 32 pcs (16-bit IC)
Lighting system	Dynamic	Dynamic and static	Static	Static	Static
Brightness	Low	High	High	High	Very high

TB62200AF

Dual-Stepping Motor Driver IC Using PWM Chopper Type

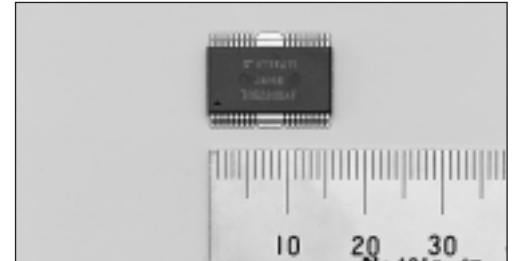
The **TB62200F** is a dual-stepping motor driver driven by chopper micro-step pseudo sine wave. To drive two-phase stepping motors, two pairs of 16-bit latch and shift registers are built in the IC.

The IC is optimal for driving stepping motors at high efficiency and with low-torque ripple. The IC supports Mixed Decay mode for switching the attenuation ratio at chopping. The switching time for the attenuation ratio can be switchrd in two stages according to the load.

Features

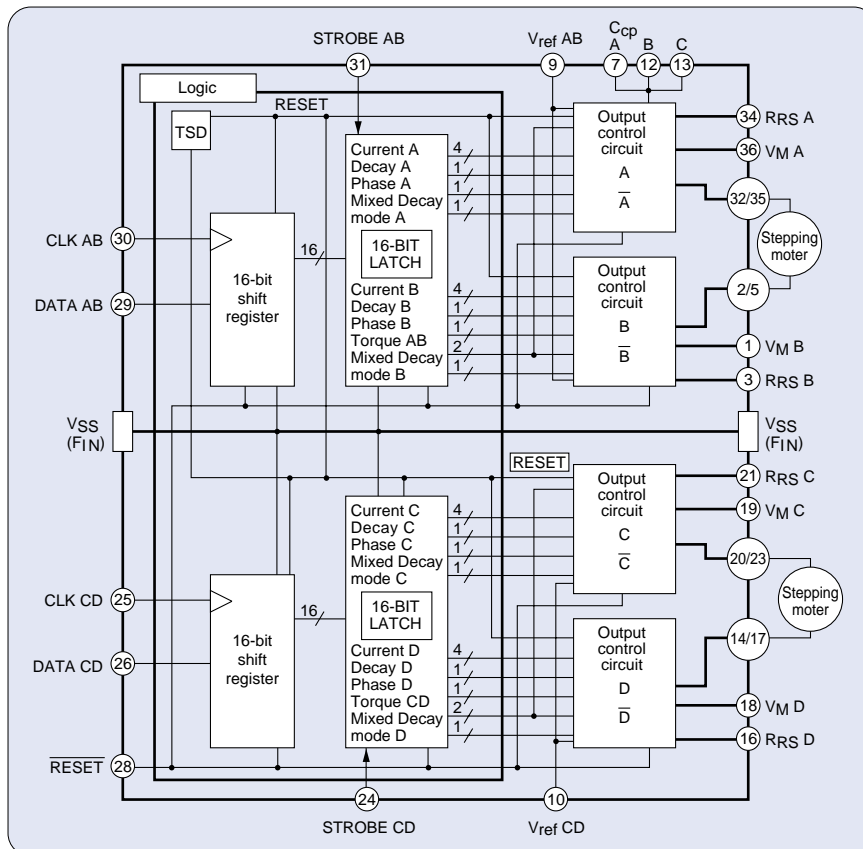
- Chopping bipolar stepping motor driver
- Two stepping motors driven by micro-step pseudo sine wave are controlled by a single driver IC
- Monolithic Bi-CMOS IC
- Low ON = resistance of RDS (on) = 0.5Ω (@Tj = 25°C, 1.0 A : Typ.)
- Two pairs of built-in 16-bit shift and latch registers
- Two pairs of built-in 4-bit DA converters for micro steps
- Built-in TSD, V_{DD} & V_M power monitor (reset) circuit for protection

Package

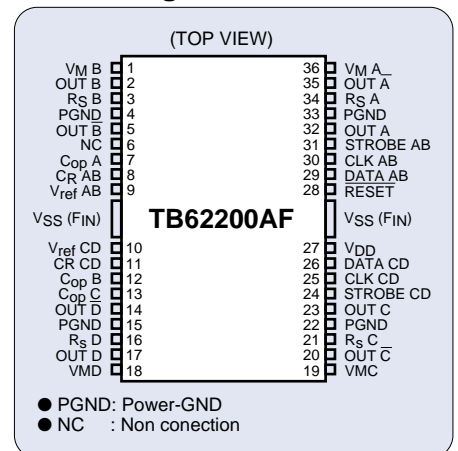


- Built-in charge pump circuit (two external capacitors)
- 36-pin power flat package (HSOP36-P-450-0.65)
- Output voltage : 30 V (max)
- Output current : 1.3 A / phase max
- Built-in Mixed Decay mode (Fast / Slow at 40 / 74% switchable) and Slow Decay mode
- Chopping frequency can be set by external resistors and capacitors. High-speed chopping possible at 100 kHz or higher.

Block Diagram



Pin Assignment





Intelligent Drivers

Clock Driver for Linear CCDs

TB62801F

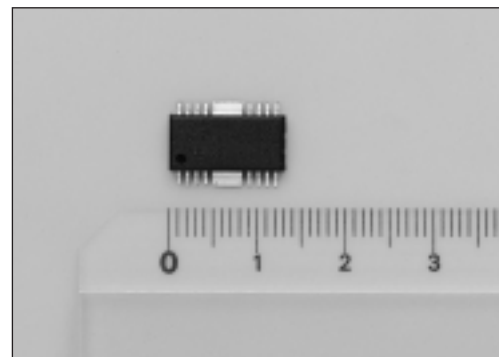
The **TB62801F** is a driver for CCD linear image sensor input signals, and enables efficient driving of CCD input capacitance. Because it is equipped with inverted output, cross-points are easily controlled. This device is also fitted with a 1 input / 4 output distribution driver for use by the main clock, and a 5-bit driver for control purposes.

Features:

- High-speed operation : 20 MHz (supports 40 MPPS* CCDs**)
- Driving of high loads : 450 pF (during 20 MHz operations)
- Output amplitude : > 4.5 V ($V_{CC} = 4.7$ V)
- Cross-point : > 1.5 V ($V_{CC} = 4.7$ V)
- Low skew : 2 ns (typical)
- High power dissipation package :

$P_D = 1.5$ W (maximum when actually mounted)

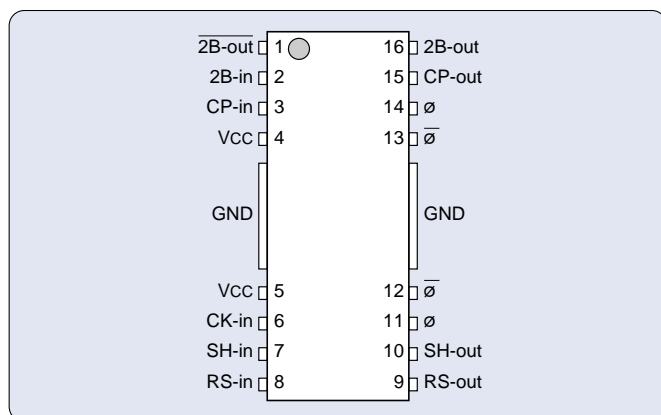
Package



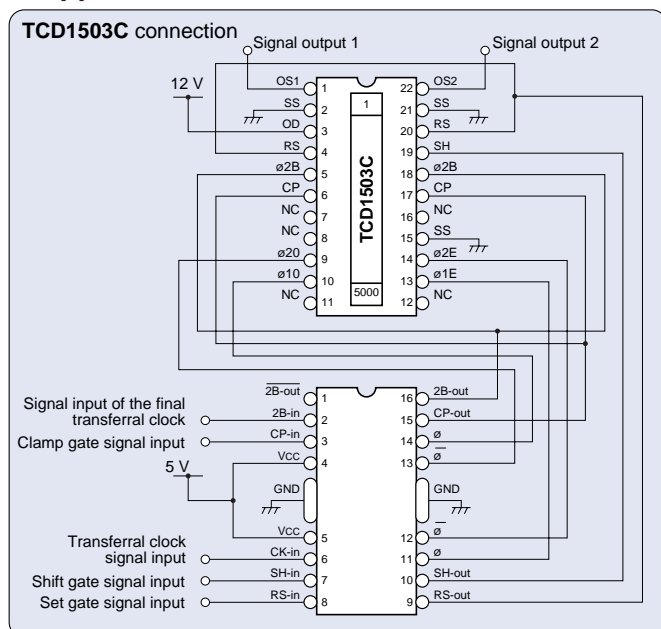
* PPS = Pixel / Is per second

** CCD = Charge Coupled Device

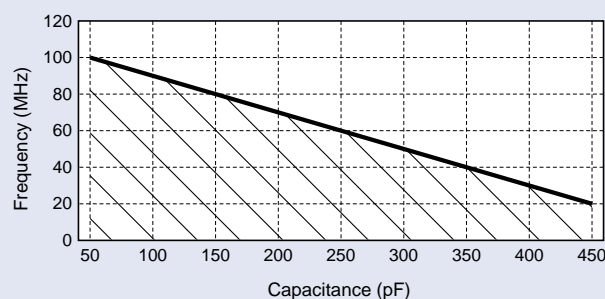
Pin assignment (TOP VIEW)



Application circuit

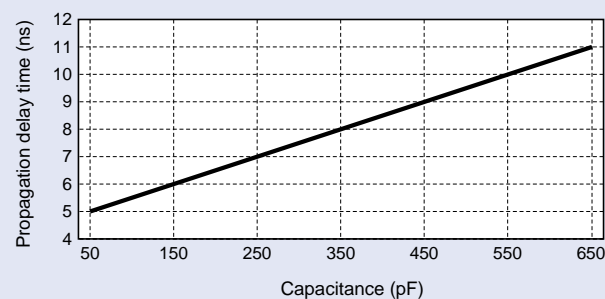


Load capacitance versus maximum operating frequency (with all bits operating)



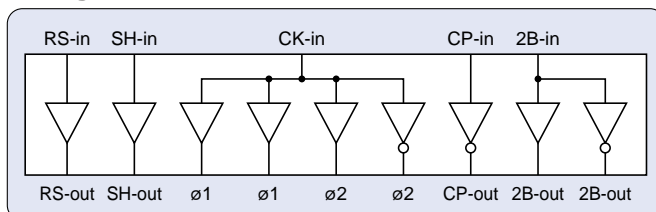
The line bounding the shaded region in the graph above is the locus of all maximum combinations of load and frequency within which the device can be operated. Light-load bits are fixed at a capacitance of 30 pF.

Propagation delay time versus load capacitance With the heavy-load drive (ø at 1-bit)



$V_{CC} = 5.0$ V, $T_a = 25^\circ\text{C}$, $t_{ri} / t_{fi} = 2.5$ ns

Logic chart



In this particular circuit, a large current is needed to drive the CCD.

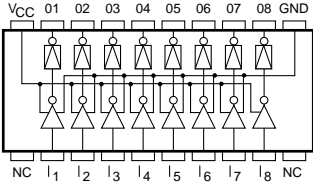
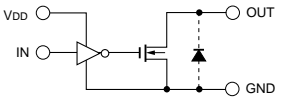
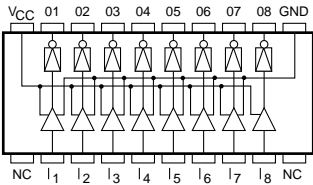
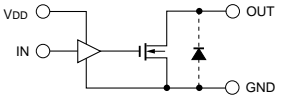
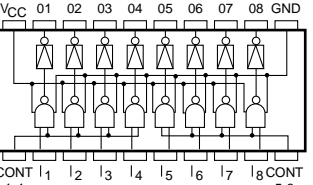
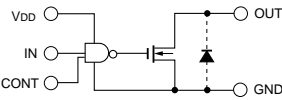
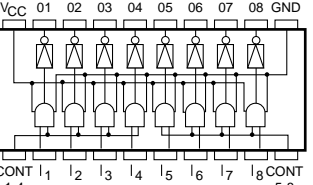
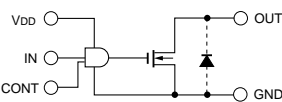
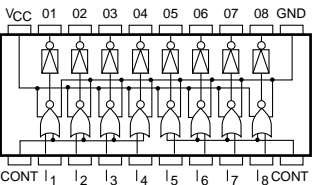
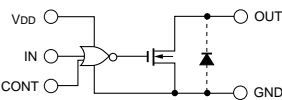
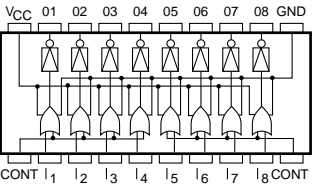
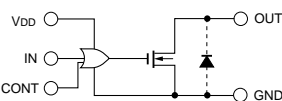
It is recommended that a personal computer be used to stabilize the voltage of the 5V mains power used by the driver.

● DMOS Transistor Arrays

Static pre-drive (base) current flows if bipolar transistors are used as drivers when performing switching control for large-current loads, and this may lead to cases in which the electromotive loss of current is increased, or in which restrictions are placed on the driving performance of the device located at the previous stage.

DMOS transistor arrays provide a simple method for enabling interfaces to reduce the amount of electromotive loss and provide a high-speed, high-sustaining-voltage, high-output driver by incorporating high-speed CMOS logic at the input stage with the use of our independently-developed Bi-CMOS process, together with DMOS transistors at the driving stage.

DMOS Transistor Arrays

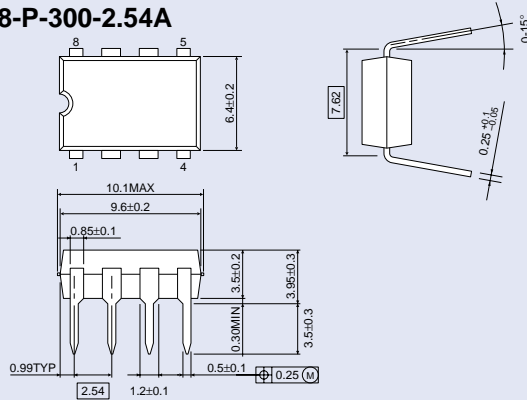
Product number	Function	Rating			Pin assignment	Equivalent circuit	Package
		V _{OUT} (V)	I _{OUT} (mA)	Clamp diode			
TB62003P/F/FW	Octal inverter & DMOS drivers	35	200	—			DIP20
							SOP20
							SOL20
TB62004P/F/FW	Octal through & DMOS drivers	35	200	—			DIP20
							SOP20
							SOL20
TB62006P/F/FW	Octal NAND & DMOS drivers with enable	35	200	—			DIP20
							SOP20
							SOL20
TB62007P/F/FW	Octal AND & DMOS drivers with enable	35	200	—			DIP20
							SOP20
							SOL20
TB62008P/F/FW	Octal NOR & DMOS drivers with enable	35	200	—			DIP20
							SOP20
							SOL20
TB62009P/F/FW	Octal OR & DMOS drivers with enable	35	200	—			DIP20
							SOP20
							SOL20



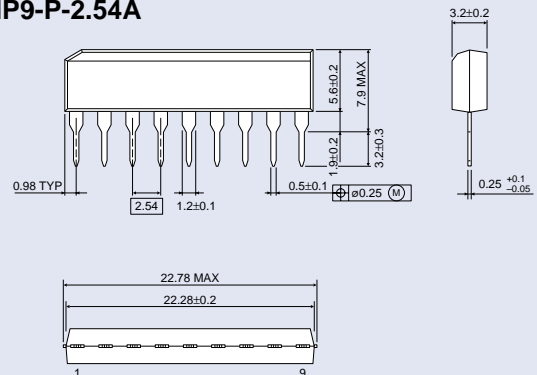
Package Dimensions

Unit: mm

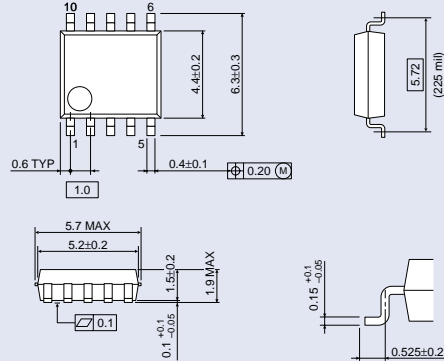
●DIP8-P-300-2.54A



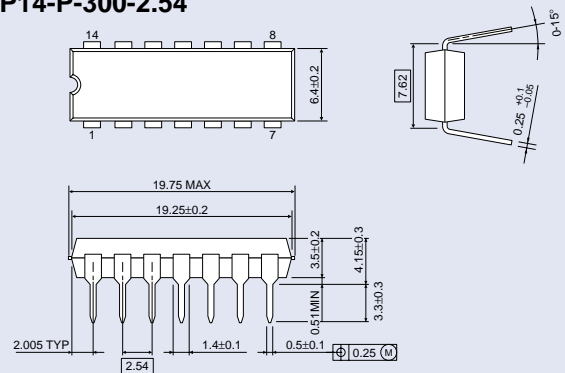
●SIP9-P-2.54A



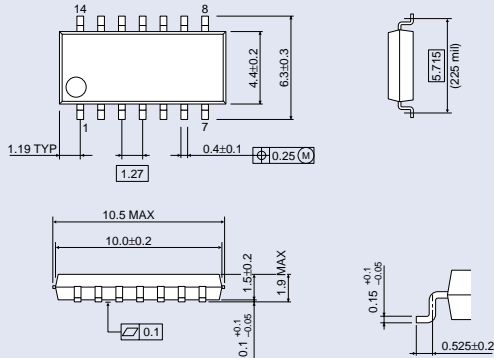
●SSOP10-P-225-1.00



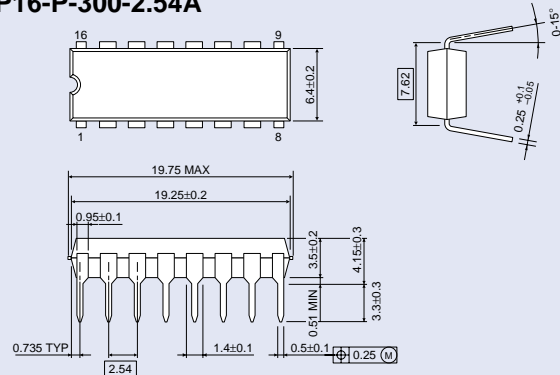
●DIP14-P-300-2.54



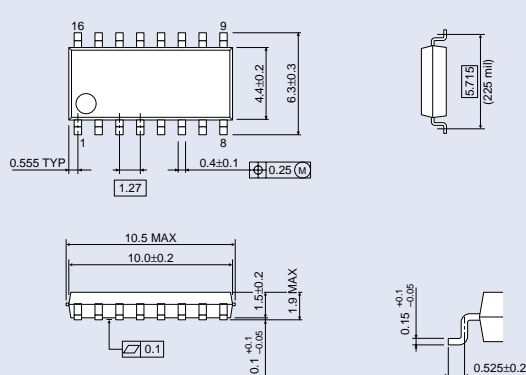
●SOP14-P-225-1.27



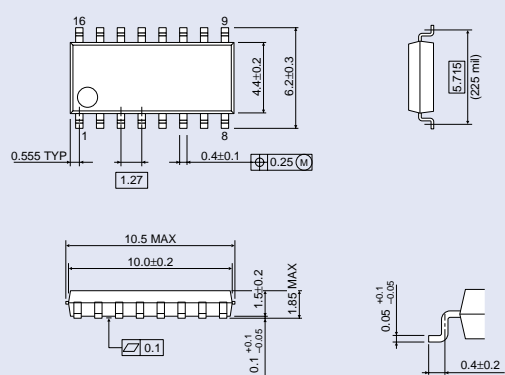
●DIP16-P-300-2.54A

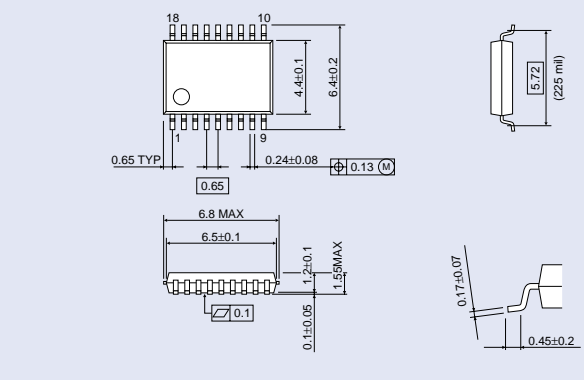
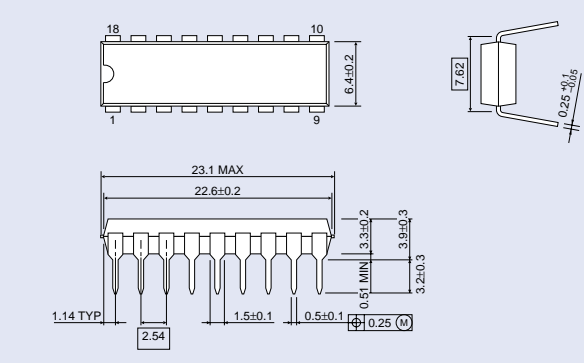
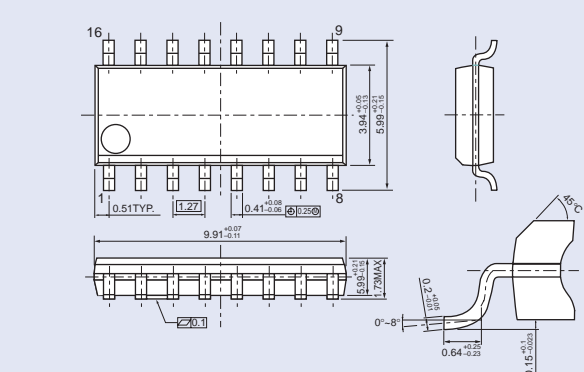
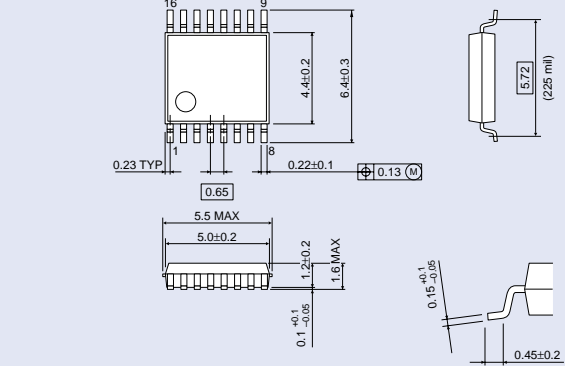


●SOP16-P-225-1.27



●SOP16-P-225-1.27B



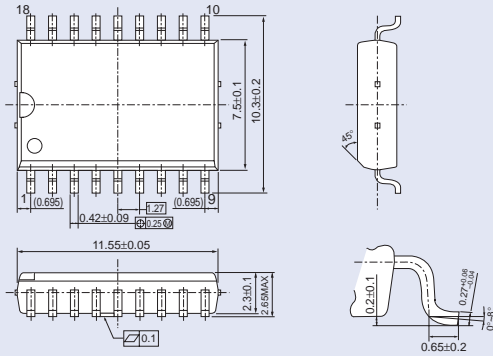




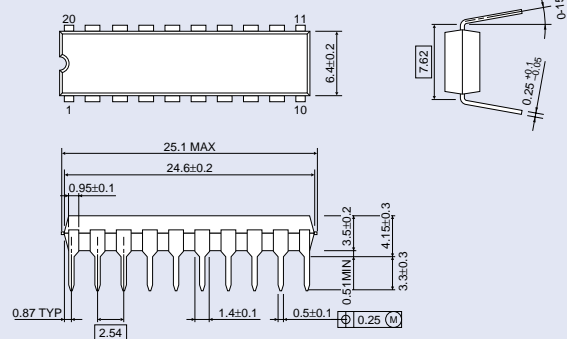
Package Dimensions

Unit: mm

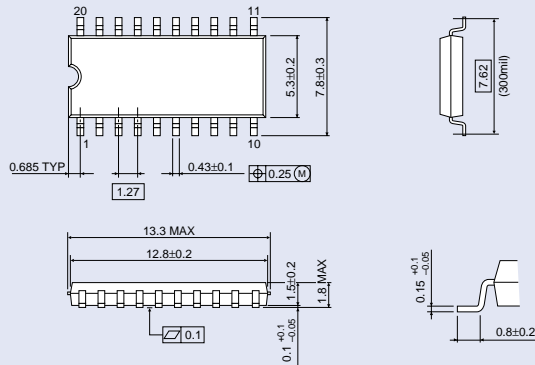
●SOL18-P-300-1.27



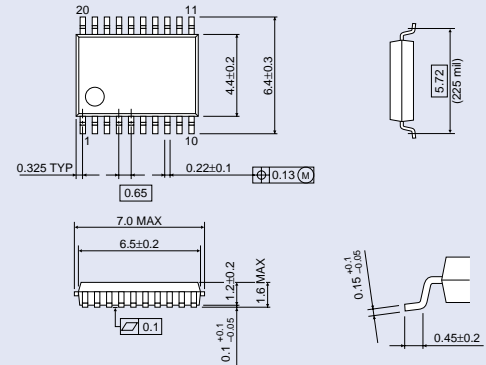
●DIP20-P-300-2.54A



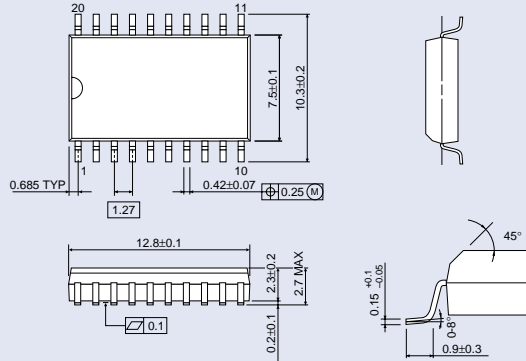
●SOP20-P-300-1.27



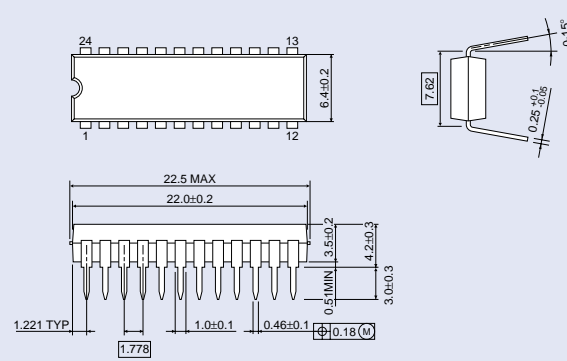
●SSOP20-P-225-0.65A



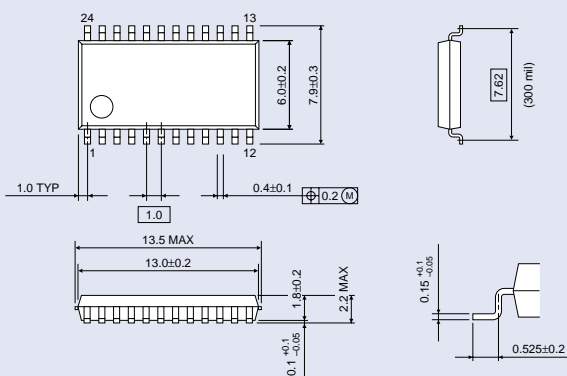
●SOL20-P-300-1.27



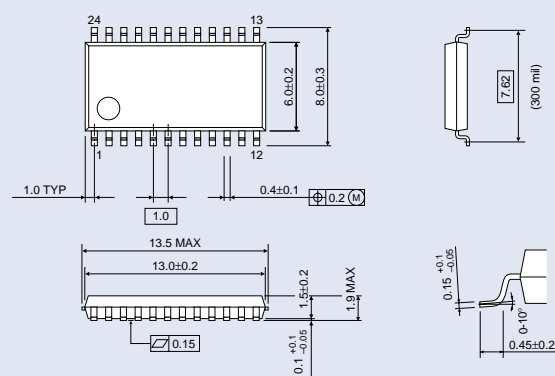
●SDIP24-P-300-1.78



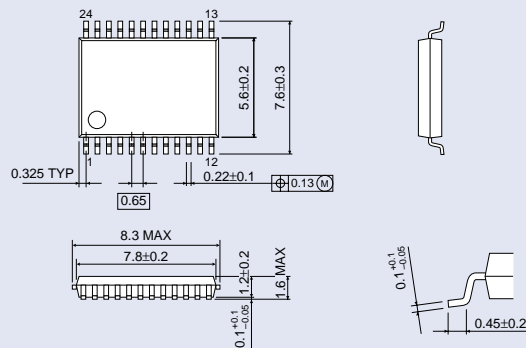
●SSOP24-P-300-1.00



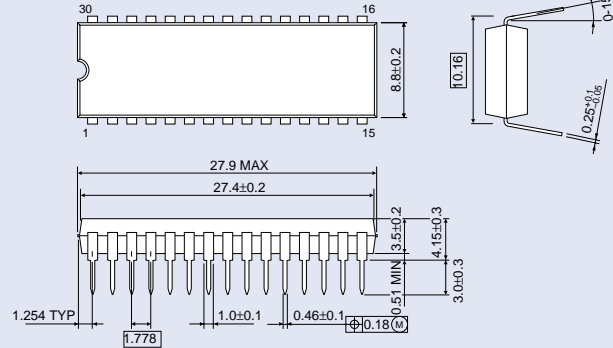
●SSOP24-P-300-1.00B



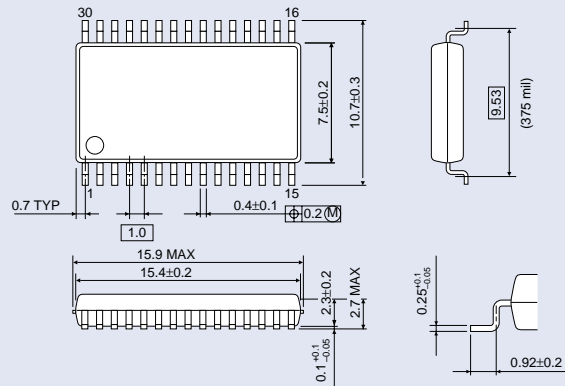
●SSOP24-P-300-0.65A



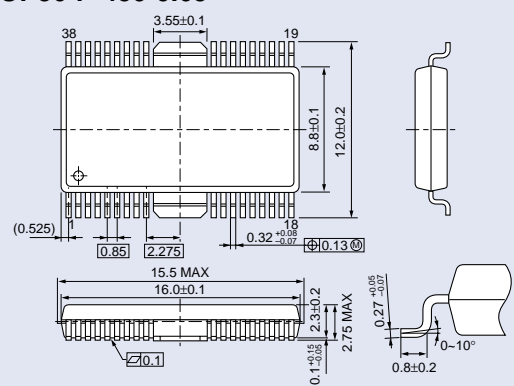
●SDIP30-P-400-1.78



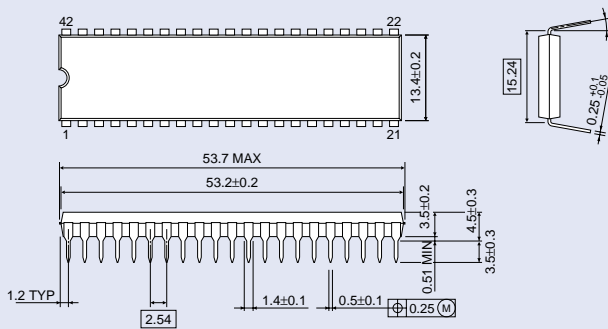
●SSOP30-P-375-1.00



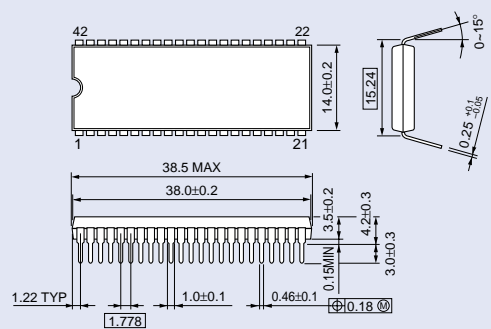
●HSOP36-P-450-0.65



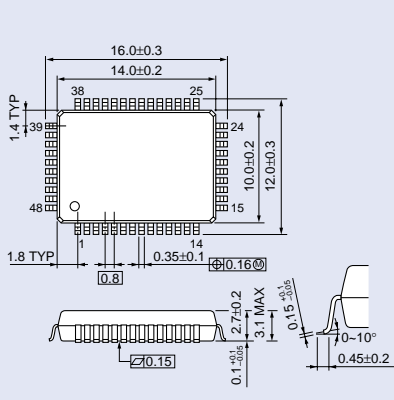
●DIP42-P-600-2.54



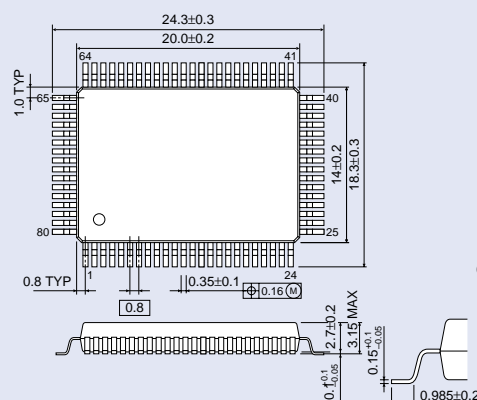
●SDIP42-P-600-1.78



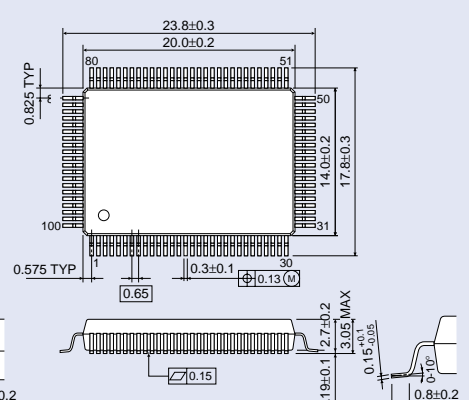
●QFP48-P-1014-0.80



●QFP80-P-1420-0.80C



●QFP100-P-1420-0.65A





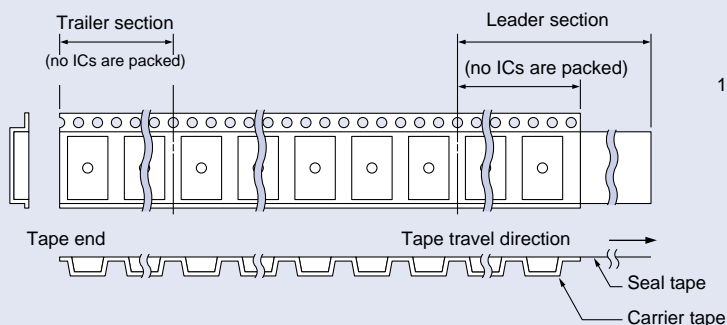
Packing Information

Both magazine and tape packing are available for Toshiba Interface Driver ICs.

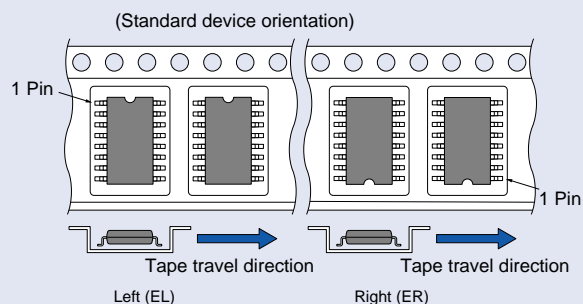
● Tape Specifications

Embossed Tape (SOP/SSOP/SOL)

■ Tape Schematics



■ Device Orientation



■ How to order

When ordering IC's on embossed tapes, specify the product name, type of tape, and quantity as follows.

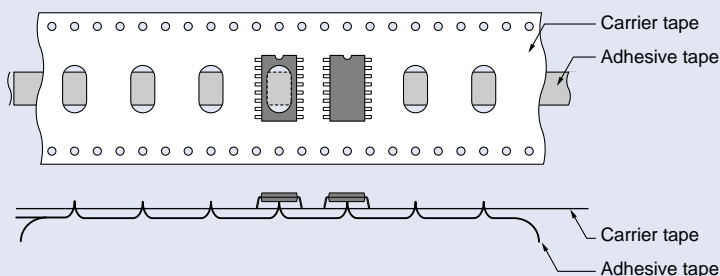
(Example)

TD62003AF (EL) 10,000

Quantity (*)
Type of tape (E: embossed)
Name of IC

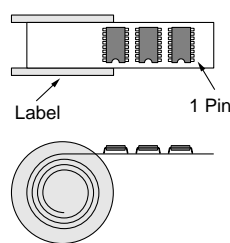
Adhesive Tape (SOP/SSOP/SOL)

■ Tape Schematics

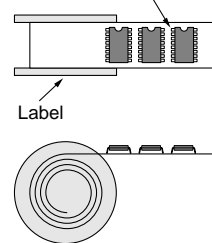


■ Device Orientation

Type_1 (TP1)



Type_2 (TP2)



■ How to order

When ordering ICs on adhesive tapes, specify the product name, type of tape, and quantity as follows.

(Example)

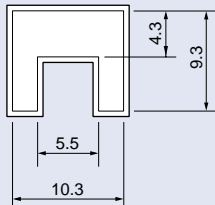
TD62003AF (TP2) 12,000

Quantity (*)
Device orientation (L or R)
Name of IC

● Magazine

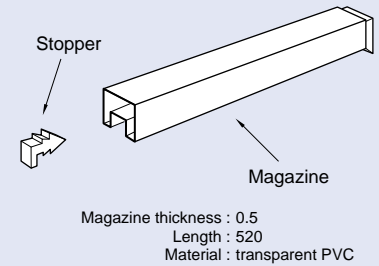
DIP package

■ Magazine name: 7VC771B



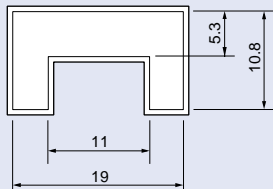
Unit: mm

Package code	Capacity
DIP8-P-300-2.54A	50 per magazine
DIP14-P-300-2.54	25 per magazine
DIP16-P-300-2.54A	25 per magazine
DIP18-P-300-2.54D	20 per magazine
DIP18-P-300-2.54F	20 per magazine
DIP20-P-300-2.54D	20 per magazine
SDIP24-P-300-1.78	25 per magazine



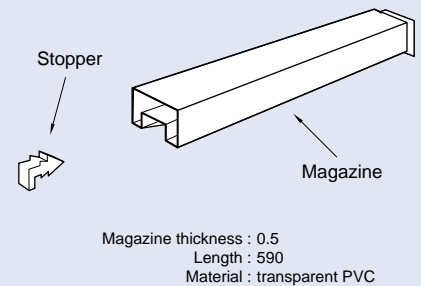
DIP package

■ Magazine name: 7VC617B



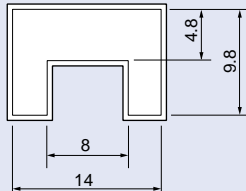
Unit: mm

Package code	Capacity
DIP42-P-600-2.54	10 per magazine



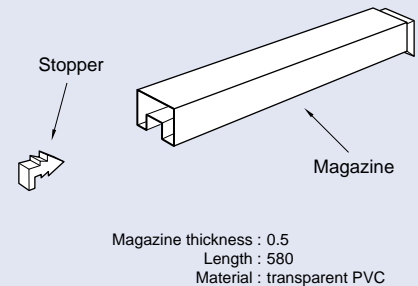
SDIP package

■ Magazine name: 7VC697B



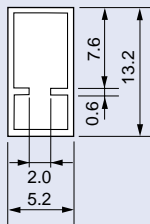
Unit: mm

Package code	Capacity
SDIP30-P-400-1.78	20 per magazine



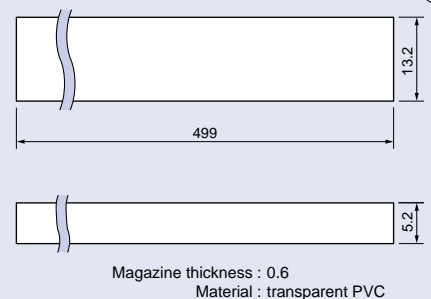
SIP package

■ Magazine name: 7VC555A1



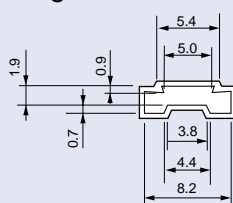
Unit: mm

Package code	Capacity
SIP9-P-2.54A	20 per magazine



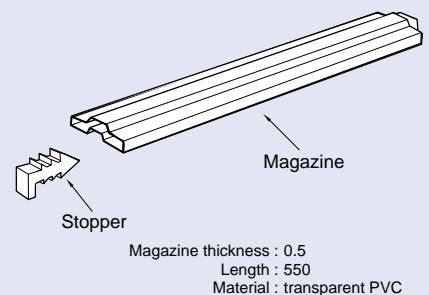
SOP/SSOP package

■ Magazine name: 7VC748B



Unit: mm

Package code	Capacity
SOP14-P-225-1.27	50 per magazine
SOP16-P-225-1.27	50 per magazine
SOP16-P-225-1.27B	50 per magazine
SSOP10-P-225-1.00	100 per magazine
SSOP16-P-225-1.00	50 per magazine

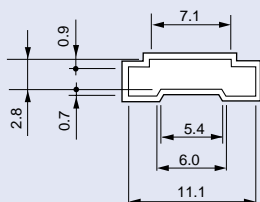




Packing Information

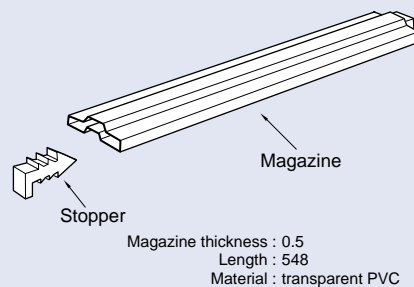
SOP/HSOP package

■ Magazine name: 7VC669B



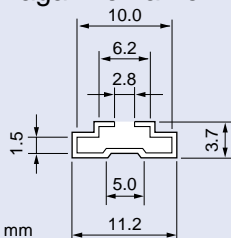
Unit: mm

Package code	Capacity
SOP18-P-375-1.27	40 per magazine
HSOP16-P-300-1.00	40 per magazine



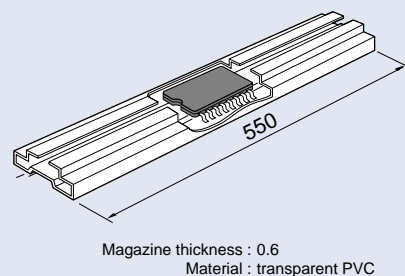
SOP package

■ Magazine name: 7VC747B2



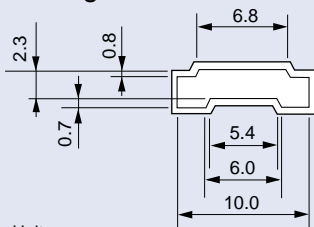
Unit: mm

Package code	Capacity
SOP20-P-300-1.27	40 per magazine



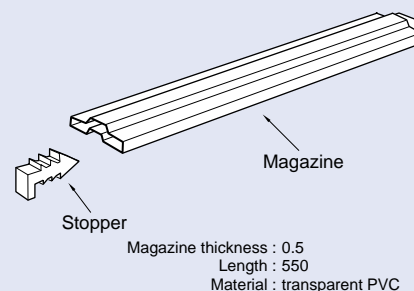
SSOP package

■ Magazine name: 7VC758B



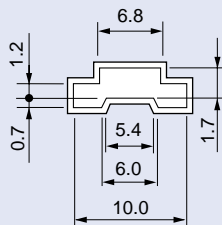
Unit: mm

Package code	Capacity
SSOP24-P-300-1.00	40 per magazine



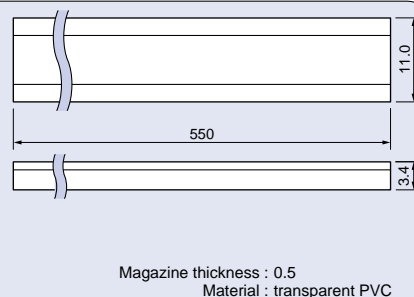
SSOP package

■ Magazine name: 8VCA89A



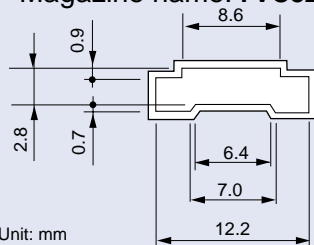
Unit: mm

Package code	Capacity
SSOP24-P-300-1.00B	20 per magazine



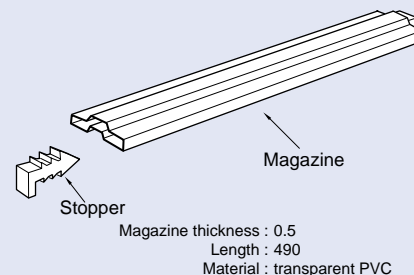
SSOP package

■ Magazine name: 7VC825A



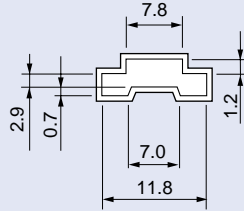
Unit: mm

Package code	Capacity
SSOP30-P-375-1.00	30 per magazine



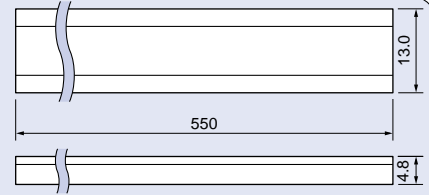
SOL package

■ Magazine name: 8VCOC7A



Unit: mm

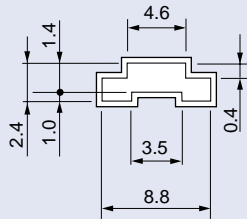
Package code	Capacity
SOL20-P-300-1.27	40 per magazine



Magazine thickness : 0.6
Material : transparent PVC

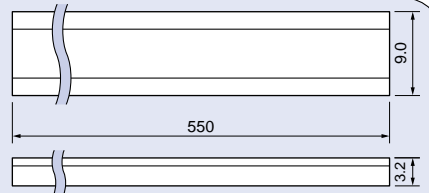
SSOP package

■ Magazine name: 8VCA33A



Unit: mm

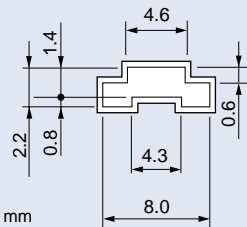
Package code	Capacity
SSOP16-P-225-0.65B	100 per magazine



Magazine thickness : 0.5
Length : 550
Material : transparent PVC

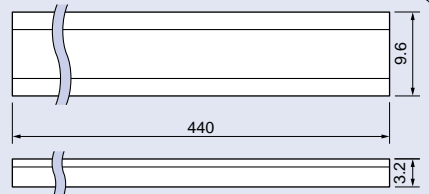
SSOP package

■ Magazine name: 8VCA88A



Unit: mm

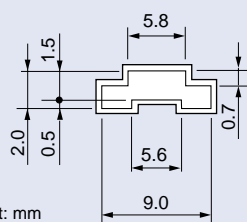
Package code	Capacity
SSOP20-P-225-0.65A	60 per magazine



Magazine thickness : 0.4
Material : transparent PVC

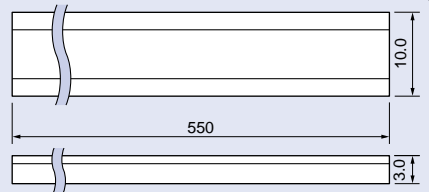
SSOP package

■ Magazine name: 8VC34A



Unit: mm

Package code	Capacity
SSOP24-P-300-0.65A	65 per magazine



Magazine thickness : 0.5
Material : transparent PVC

**Toshiba America
Electronic Components, Inc.**
Headquarters-Irvine, CA

9775 Toledo Way, Irvine, CA 92618, U.S.A.
Tel: (949)455-2000 Fax: (949)859-3963

Boulder, CO

3100 Arapahoe Avenue, Ste. 500,
Boulder, CO 80303, U.S.A.
Tel: (303)442-3801 Fax: (303)442-7216

Boynton Beach, FL(Orlando)

11924 W. Forest Hill Blvd., Ste. 22-337,
Boynton Beach, FL 33414, U.S.A.
Tel: (561)374-6193 Fax: (561)374-6194

Deerfield, IL(Chicago)

One Pkwy., North, Suite 500, Deerfield,
IL 60015-2547, U.S.A.
Tel: (847)945-1500 Fax: (847)945-1044

Duluth, GA(Atlanta)

3700 Crestwood Parkway, Ste. 460,
Duluth, GA 30096, U.S.A.
Tel: (770)931-3363 Fax: (770)931-7602

Edison, NJ

2035 Lincoln Hwy. Ste. #3000, Edison
NJ 08817, U.S.A.
Tel: (732)248-8070 Fax: (732)248-8030

Orange County, CA

2 Venture Plaza, #500 Irvine, CA 92618, U.S.A.
Tel: (949)453-0224 Fax: (949)453-0125

Portland, OR

1700 NW 167th Place, #240,
Beaverton, OR 97006, U.S.A.
Tel: (503)629-0818 Fax: (503)629-0827

Richardson, TX(Dallas)

777 East Campbell Rd., Suite 650, Richardson,
TX 75081, U.S.A.
Tel: (972)480-0470 Fax: (972)235-4114

San Jose Engineering Center, CA

1060 Rincon Circle, San Jose, CA 95131, U.S.A.
Tel: (408)526-2400 Fax: (408)526-2410

Wakefield, MA(Boston)

401 Edgewater Place, Suite #360, Wakefield,
MA 01880-6229, U.S.A.
Tel: (781)224-0074 Fax: (781)224-1095

Toshiba Electronics Europe GmbH
Düsseldorf Head Office

Hansaallee 181, D-40549 Düsseldorf
Germany
Tel: (0211)5296-0 Fax: (0211)5296-400

München Office

Büro München Hofmannstrasse 52,
D-81378, München, Germany
Tel: (089)748595-0 Fax: (089)748595-42

Toshiba Electronics France SARL

Immeuble Robert Schumann 3 Rue de Rome,
F-93561, Rosny-Sous-Bois, Cedex, France
Tel: (1)48-12-48-12 Fax: (1)48-94-51-15

Toshiba Electronics Italiana S.R.L.

Centro Direzionale Colleoni
Palazzo Perseo Ingr. 2-Piano 6,
Via Paracelso n.12,
1-20041 Agrate Brianza Milan, Italy
Tel: (039)68701 Fax: (039)6870205

Toshiba Electronics España, S.A.

Parque Empresarial San Fernando Edificio Europa,
1ª Planta, ES-28831 Madrid, Spain
Tel: (91)660-6700 Fax: (91)660-6799

Toshiba Electronics(UK) Limited

Riverside Way, Camberley Surrey,
GU15 3YA, U.K.
Tel: (01276)69-4600 Fax: (01276)69-4800

Toshiba Electronics Scandinavia AB

Gustavslundsvägen 12, 2nd Floor
S-161 15 Bromma, Sweden
Tel: (08)704-0900 Fax: (08)80-8459

**Toshiba Electronics Asia
(Singapore) Pte. Ltd.**

Singapore Head Office
438B Alexandra Road, #06-08/12 Alexandra
Technopark, Singapore 119968
Tel: (278)5252 Fax: (271)5155, (270)6056

Bangkok Office

135 Moo 5 Bangkadi Industrial Park, Tivanon Rd.,
Bangkadi Amphur Muang Pathumthani, Bangkok,
12000, Thailand
Tel: (02)501-1635 Fax: (02)501-1638

**Toshiba Electronics Trading
(Malaysia)Sdn. Bhd.**

Kuala Lumpur Head Office
Suite W1203, Wisma Consplant, No.2,
Jalan SS 16/4, Subang Jaya, 47500 Petaling Jaya,
Selangor Darul Ehsan, Malaysia
Tel: (3)731-6311 Fax: (3)731-6307

Penang Office

Suite 13-1, 13th Floor, Menard Penang Garden,
42-A, Jalan Sultan Ahmad Shah,
100 50 Penang, Malaysia
Tel: 4-226-8523 Fax: 4-226-8515

Toshiba Electronics Philippines, Inc.

26th Floor, Citibank Tower, Valero Street, Makati,
Manila, Philippines
Tel: (02)750-5510 Fax: (02)750-5511

Toshiba Electronics Asia, Ltd.
Hong Kong Head Office

Level 11, Top Glory Insurance Building, Grand Century
Place, No.193, Prince Edward Road West,
Mong Kok, Kowloon, Hong Kong
Tel: 2375-6111 Fax: 2375-0969

Beijing Office

Rm 714, Beijing Fortune Building,
No.5 Dong San Huan Bei-Lu, Chao Yang District,
Beijing, 100004, China
Tel: (010)6590-8795 Fax: (010)6590-8791

Chengdu Office

Unit F, 18th Floor, New Times Plaza, 42 Wenwu Road,
Xinhua Avenue, Chengdu, 610017, China
Tel: (028)675-1773 Fax: (028)675-1065

Shenzhen Office

Rm 3010-3012, Office Tower Shun Hing Square,
Di Wang Commercial Centre, 333 ShenNan
East Road, Shenzhen, 518008, China
Tel: (0755)246-1582 Fax: (0755)246-1581

Toshiba Electronics Korea Corporation
Seoul Head Office

14/F, KEC B/D, 257-7 Yangjae-Dong,
Seocho-ku, Seoul, Korea
Tel: (02)589-4334 Fax: (02)589-4302

Kumi Office

6/F, Ssangyong Investment Securities B/D,
56 Songjung-Dong, Kumi City
Kyeongbuk, Korea
Tel: (82)546-456-7613 Fax: (82)546-456-7617

**Toshiba Technology Development
(Shanghai) Co., Ltd.**

23F, Shanghai Senmao International Building, 101
Yin Cheng East Road, Pudong New Area, Shanghai,
200120, China
Tel: (021)6841-0666 Fax: (021)6841-5002

**Tsurong Xiamen Xiangyu Trading
Co., Ltd.**

8N, Xiamen SEZ Bonded Goods Market Building,
Xiamen, Fujian, 361006, China
Tel: (0592)562-3798 Fax: (0592)562-3799

**Toshiba Electronics Taiwan
Corporation**
Taipei Head Office

17F, Union Enterprise Plaza Bldg. 109
Min Sheng East Rd., Section 3, 0446 Taipei,
Taiwan
Tel: (02)514-9988 Fax: (02)514-7892

Kaohsiung Office

16F-A, Chung-Cheng Bldg., Chung-Cheng 3Rd.,
80027, Kaohsiung, Taiwan
Tel: (07)222-0826 Fax: (07)223-0046

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In Touch with Tomorrow
TOSHIBA

TOSHIBA CORPORATION
Electronic Devices Sales & Marketing Group

1-1, Shibaura 1-chome, Minato-ku, Tokyo, 105-8001, Japan
Tel: (03)3457-3405 Fax: (03)5444-9431