#### **Features**

- High-speed address/chip select time
  - Commercial: 20/25/35ns (max.)
  - Industrial: 20/25/35ns (max.)
  - Military: 25/35/45/55/70/85/100ns (max.)
- Low-power operation
- Battery Backup operation 2V data retention
- Produced with advanced high-performance CMOS technology
- Input and output directly TTL-compatible
- Available in standard 28-pin (300 or 600 mil) ceramic DIP, 28-pin (300 mil) SOJ
- Military product compliant to MIL-STD-883, Class B
- Industrial temperature range (-40°C to +85°C) is available for selected speeds
- Green parts available, see ordering information

### **Description**

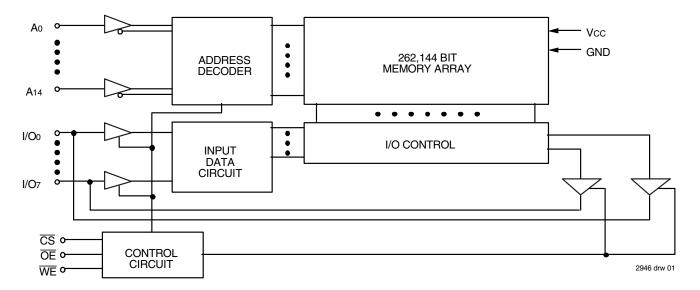
The IDT 71256 is a 262,144-bit high-speed static RAM organized as 32K x 8. It is fabricated using high-performance, high-reliability CMOS technology.

Address access times as fast as 20ns are available with power consumption of only 350mW (typ.). The circuit also offers a reduced power standby mode. When  $\overline{CS}$  goes HIGH, the circuit will automatically go to and remain in, a low-power standby mode as long as  $\overline{CS}$  remains HIGH. This capability provides significant system level power and cooling savings. The low-power (L) version also offers a battery backup data retention capability where the circuit typically consumes only  $5\mu\text{W}$  when operating off a 2V battery.

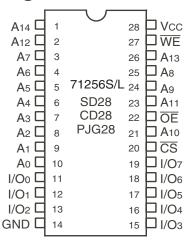
The IDT71256 is packaged in a 28-pin (300 or 600 mil) ceramic DIP, a 28-pin 300 mil SOJ providing high board level packing densities.

The IDT71256 military RAM is manufactured in compliance with the latest revision of MIL-STD-883, Class B, making it ideally suited to military temperature applications demanding the highest level of performance and reliability.

### **Functional Block Diagram**



### Pin Configurations<sup>(1)</sup>



2946 drw 02

### DIP/SOJ Top View

#### NOTE:

1. This text does not indicate orientation of actual part-marking.

### **Pin Descriptions**

Name	Description
A0 - A14	Address Inputs
I/Oo - I/O7	Data Input/Output
<u>cs</u>	Chip Select
WE	Write Enable
ŌĒ	Output Enable
GND	Ground
Vcc	Power

2946 tbl 01

### Truth Table<sup>(1)</sup>

WE	Ċ≅	Œ	I/O	Function
Х	Н	Х	High-Z	Standby (ISB)
Х	Vнс	Х	High-Z	Standby (ISB1)
Н	L	Н	High-Z	Output Disabled
Н	L	L	Dout	Read Data
L	L	Χ	Din	Write Data

2946 tbl 02

2946 tbl 03

NOTE:

1. H = V<sub>IH</sub>, L = V<sub>IL</sub>, X = Don't care.

### Absolute Maximum Ratings(1)

Symbol	Rating	Com'l.	Ind.	Mil.	Unit
VTERM	Terminal Voltage with Respect to GND	-0.5 to +7.0	-0.5 to +7.0	-0.5 to +7.0	V
ТА	Operating Temperature	0 to +70	-40 to +85	-55 to +125	°C
TBIAS	Temperature Under Bias	-55 to +125	-55 to +125	-65 to +135	°C
Тѕтс	Storage Temperature	-55 to +125	-55 to +125	-65 to +150	°C
Рт	Power Dissipation	1.0	1.0	1.0	W
Іоит	DC Output Current	50	50	50	mA

NOTE:

Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS
may cause permanent damage to the device. This is a stress rating only and
functional operation of the device at these or any other conditions above those
indicated in the operational sections of this specification is not implied. Exposure
to absolute maximum rating conditions for extended periods may affect
reliability.

### Capacitance (TA = +25°C, f = 1.0MHz)

Symbol	Parameter <sup>(1)</sup>	Conditions	Max.	Unit
CIN	Input Capacitance	VIN = 0V	11	pF
Cvo	I/O Capacitance	Vout = 0V	11	pF

NOTE:

 This parameter is determined by device characterization, but is not production tested

### **Recommended Operating Temperature and Supply Voltage**

Grade	Temperature	GND	Vcc
Military	-55°C to +125°C	0V	5V ± 10%
Industrial	-40°C to +85°C	0V	5V ± 10%
Commercial	0°C to +70°C	0V	5V ± 10%

2946 tbl 05

### **Recommended DC Operating Conditions**

Symbol	Parameter	Min.	Тур.	Max.	Unit
Vcc	Supply Voltage	4.5	5.0	5.5	V
GND	Ground	0	0	0	V
VIH	Input High Voltage	2.2	_	6.0	٧
VIL	Input Low Voltage	-0.5 <sup>(1)</sup>		0.8	V

2946 tbl 06

1.  $V_{IL}$  (min.) = -3.0V for pulse width less than 20ns, once per cycle.

### DC Electrical Characteristics<sup>(1,2)</sup> (Vcc = 5.0V ± 10%, VLc = 0.2V, VHc = Vcc - 0.2V)

	oti iodi olidi dotoli stios	(100 - 3.01 - 10%, 120 - 3.21, 110 - 100 - 3.21)								
			71256S/L20	71256	S/L25	71256	S/L35	71256S/L45		
Symbol	Parameter	Power	Com'l. & Ind	Com'l & Ind	Mil.	Com'l. & Ind	Mil.	Mil.	Unit	
ICC	Dynamic Operating Current	S			150		140	135	mA	
$\overline{CS} \le VIL$ , Outputs Open $VCC = Max.$ , $f_{MAX}^{(2)}$	L	135	125	130	115	120	115			
ISB	Standby Power Supply Current	S			20		20	20	mA	
	Outputs Open, $f = f_{Max}^{(2)}$	L	3	3	3	3	3	3		
ISB1	Full Standby Power Supply Current	S	_		20		20	20	mA	
	(CMOS Level), $\overline{CS} \ge VHC$ , Vcc = Max., f = 0	L	0.6	0.6	1.5	0.6	1.5	1.5		

2946 tbl 07

			71256S/L55	71256S/L70	71256S/L85	71256S/L100	
Symbol	Parameter	Power	Mil.	Mil.	Mil.	Mil.	Unit
ICC	Dynamic Operating Current CS < VIL, Outputs Open	S	135	135	135	135	mA
	Vcc = Max., fMax <sup>(2)</sup>	L	115	115	115	115	
ISB	Standby Power Supply Current	S	20	20	20	20	mA
	(TTL Level), $\overline{CS} \ge V_{H}$ , $V_{CC} = Max.$ , Outputs Open, $f = f_{MAX}^{(2)}$	L	3	3	3	3	
ISB1	Full Standby Power Supply Current (CMOS Level), CS > VHc,	S	20	20	20	20	mA
	$V_{CC} = Max., f = 0$	L	1.5	1.5	1.5	1.5	

NOTES:

2946 tbl 08

- 1. All values are maximum guaranteed values.
- 2. fMAX = 1/tRC, all address inputs are cycling at fMAX; f = 0 means no address pins are cycling.

#### **AC Test Conditions**

Input Pulse Levels	GND to 3.0V
Input Rise/Fall Times	5ns
Input Timing Reference Levels	1.5V
Output Reference Levels	1.5V
AC Test Load	See Figures 1 and 2

2946 tbl 09

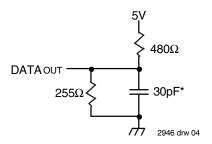


Figure 1. AC Test Load

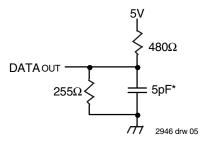


Figure 2. AC Test Load (for tclz, tolz, tchz, tohz, tow, and twhz)

\*Includes scope and jig capacitances

### DC Electrical Characteristics (Vcc = 5.0V ± 10%)

				IDT71256S						
Symbol	Parameter	Test Conditions		Min.	Тур.	Max.	Min.	Тур.	Max.	Unit
lu	Input Leakage Current	Vcc = Max., Vin = GND to Vcc	MIL. COM"L & IND.			10 5			5 2	μΑ
lLO	Output Leakage Current	Vcc = Max., $\overline{CS}$ = Vℍ, Vout = GND to Vcc	MIL. COM"L & IND.			10 5			5 2	μΑ
Vol	Output Low Voltage	IoL = 8mA, Vcc = Min.				0.4			0.4	V
		loL = 10mA, Vcc = Min.				0.5			0.5	
Vон	Output High Voltage	IOH = -4mA, Vcc = Min.		2.4			2.4		_	V

2946 tbl 10

# Data Retention Characteristics Over All Temperature Ranges (L Version Only) (VLC = 0.2V, VHC = VCC - 0.2V)

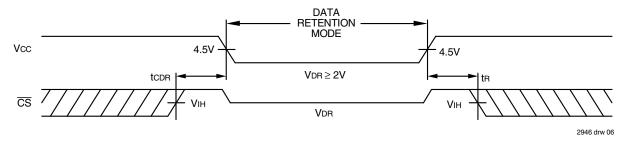
					Ty Vc	yp. <sup>(1)</sup> cc @		Max. Vcc @	
Symbol	Parameter	Test Condition		Min.	2.0V	3.0V	2.0V	3.0V	Unit
VDR	Vcc for Data Retention		_	2.0	_	_	_		٧
ICCDR	Data Retention Current		MIL. COM'L. & IND.	<u> </u>	<del></del>	<u> </u>	500 120	800 200	μΑ
tcdr	Chip Deselect to Data Retention Time	<u>CS &gt;</u> Vно	<del>CS</del> ≥ VHC			_		_	ns
tR <sup>(3)</sup>	Operation Recovery Time	1		trc(2)	_	_		_	ns

#### NOTES:

- 1. TA = +25°C.
- 2. tRC = Read Cycle Time.
- 3. This parameter is guaranteed by device characterization, but is not production tested.

2946 tbl 11

### **Low Vcc Data Retention Waveform**



AC Electrical Characteristics (Vcc = 5.0V ± 10%, All Temperature Ranges)

		71250	6L20 <sup>(1)</sup>		66S25 66L25		66S35 66L35	71256 71256	6S45 <sup>(3)</sup> 6L45 <sup>(3)</sup>	
Symbol	Parameter	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Unit
Read Cy	rcle									
trc	Read Cycle Time	20	_	25		35		45		ns
taa	Address Access Time	_	20		25		35	_	45	ns
tacs	Chip Select Access Time	_	20		25		35	_	45	ns
toLz <sup>(2)</sup>	Chip Select to Output in Low-Z	5	_	5	_	5	_	5	_	ns
tchz <sup>(2)</sup>	Chip Deselect to Output in High-Z	_	10		11	_	15	_	20	ns
toe	Output Enable to Output Valid	_	10		11		15		20	ns
toLz <sup>(2)</sup>	Output Enable to Output in Low-Z	2	_	2	_	2		0		ns
tонz <sup>(2)</sup>	Output Disable to Output in High-Z	2	8	2	10	2	15	_	20	ns
tон	Output Hold from Address Change	5	_	5	_	5	_	5	_	ns
Write Cy	ycle					-			-	
twc	Write Cycle Time	20	_	25		35	_	45		ns
tcw	Chip Select to End-of-Write	15	_	20		30	_	40		ns
taw	Address Valid to End-of-Write	15	_	20		30		40	_	ns
tas	Address Set-up Time	0	_	0		0		0		ns
twp	Write Pulse Width	15		20		30	_	35		ns
twr	Write Recovery Time	0	_	0		0	_	0	_	ns
tow	Data to Write Time Overlap	11	_	13	_	15	_	20	_	ns
twnz <sup>(2)</sup>	Write Enable to Output in High-Z	_	10		11		15	_	20	ns
tон	Data Hold from Write Time	0	_	0	_	0	_	0	_	ns
tow <sup>(2)</sup>	Output Active from End-of-Write	5		5		5		5		ns

#### NOTES:

- 2946 tbl 12
- 1. 0° to +70°C or -40° to +85°C temperature range only.
- 2. This parameter is guaranteed by device characterization, but is not production tested.
- 3.  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  temperature range only.

### **AC Electrical Characteristics** (Vcc = 5.0V ± 10%, Military Temperature Ranges)

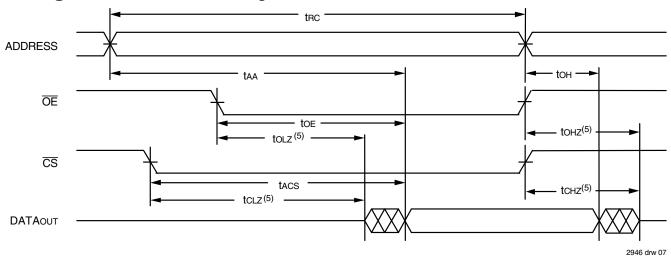
		71256 71256	SS55 <sup>(1)</sup> SL55 <sup>(1)</sup>	71256S70 <sup>(1)</sup> 71256L70 <sup>(1)</sup>		71256S85 <sup>(1)</sup> 71256L85 <sup>(1)</sup>		71256S100 <sup>(1)</sup> 71256L100 <sup>(1)</sup>		
Symbol	Parameter	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Unit
Read Cy	cle									
trc	Read Cycle Time	55		70	_	85	_	100		ns
taa	Address Access Time		55		70		85		100	ns
tacs	Chip Select Access Time		55		70		85	_	100	ns
talz(2)	Chip Select to Output in Low-Z		_	5	_	5	_	5		ns
tcHZ <sup>(2)</sup>	Chip Deselect to Output in High-Z		25	_	30	_	35	_	40	ns
toE	Output Enable to Output Valid		25	_	30		35	_	40	ns
toLz <sup>(2)</sup>	Output Enable to Output in Low-Z	0	_	0		0	_	0		ns
tonz <sup>(2)</sup>	Output Disable to Output in High-Z	0	25	0	30	_	35	_	40	ns
tон	Output Hold from Address Change	5	_	5	_	5	_	5		ns
Write Cy	cle									
twc	Write Cycle Time	55		70		85	_	100		ns
tcw	Chip Select to End-of-Write	50		60	_	70	_	80		ns
taw	Address Valid to End-of-Write	50		60	_	70	_	80		ns
tas	Address Set-up Time	0		0		0		0		ns
twp	Write Pulse Width	40	_	45	_	50		55		ns
twr	Write Recovery Time	0		0		0		0		ns
tow	Data to Write Time Overlap	25		30	_	35	_	40	_	ns
twnz <sup>(2)</sup>	Write Enable to Output in High-Z		25	_	30	_	35	_	40	ns
tон	Data Hold from Write Time (WE)	0		0	_	0	_	0		ns
tow <sup>(2)</sup>	Output Active from End-of-Write	5		5		5	_	5	_	ns

#### NOTES:

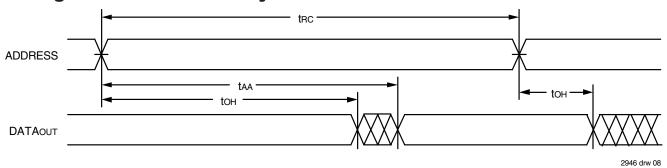
2946 tbl 13

 <sup>-55°</sup> to +125°C temperature range only.
 This parameter is guaranteed by device characterization, but is not production tested.

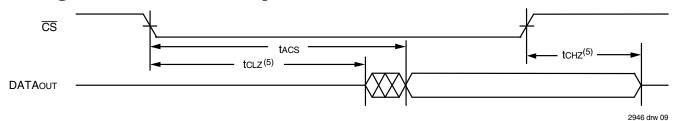
### Timing Waveform of Read Cycle No. 1(1)



### Timing Waveform of Read Cycle No. 2<sup>(1,2,4)</sup>



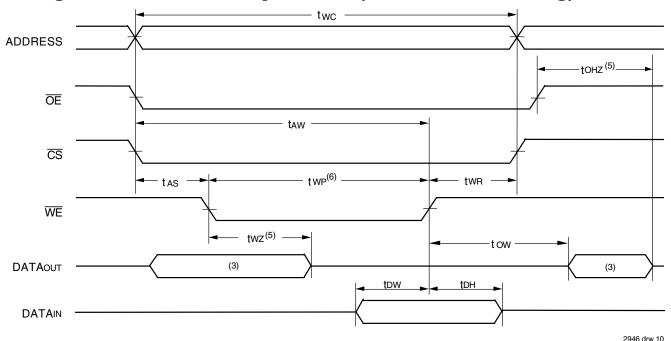
### Timing Waveform of Read Cycle No. 2<sup>(1,3,4)</sup>



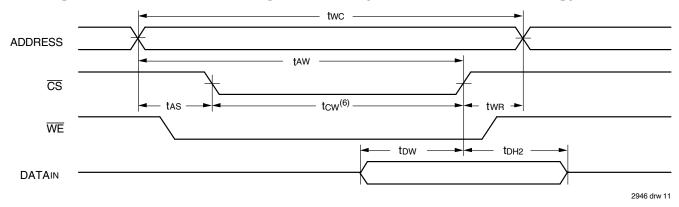
#### NOTES:

- 1. WE is HIGH for Read Cycle.
- 2. Device is continuously selected,  $\overline{\text{CS}}$  is LOW.
- 3. Address valid prior to or coincident with  $\overline{\text{CS}}$  transition LOW.
- 4.  $\overline{\sf OE}$  is LOW.
- 5. Transition is measured ±200mV from steady state.

### Timing Waveform of Write Cycle No. 1 (WE Controlled Timing)(1,2,4,6)



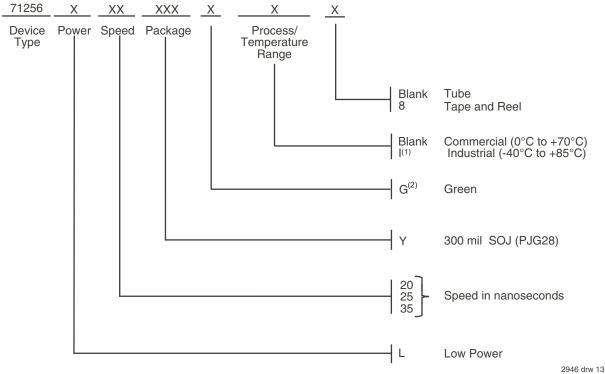
### Timing Waveform of Write Cycle No. 2 (CS Controlled Timing)(1,2,4)



#### NOTES:

- 1. A write occurs during the overlap of a LOW  $\overline{\text{CS}}$  and a LOW  $\overline{\text{WE}}$ .
- 2. twn is measured from the earlier of  $\overline{\text{CS}}$  or  $\overline{\text{WE}}$  going HIGH to the end of the write cycle.
- 3. During this period, I/O pins are in the output state so that the input signals must not be applied.
- 4. If the CS LOW transition occurs simultaneously with or after the WE LOW transition, the outputs remain in a high-impedance state.
- 5. Transition is measured ±200mV from steady state.
- 6. If  $\overline{OE}$  is LOW during a  $\overline{WE}$  controlled write cycle, the write pulse width must be the larger of twp or (twHz +tbW) to allow the I/O drivers to turn off and data to be placed on the bus for the required tbW. If  $\overline{OE}$  is HIGH during a  $\overline{WE}$  controlled write cycle, this requirement does not apply and the minimum write pulse width can be as short as the specified twp. For a CS controlled write cycle,  $\overline{OE}$  may be LOW with no degradation to tcw.

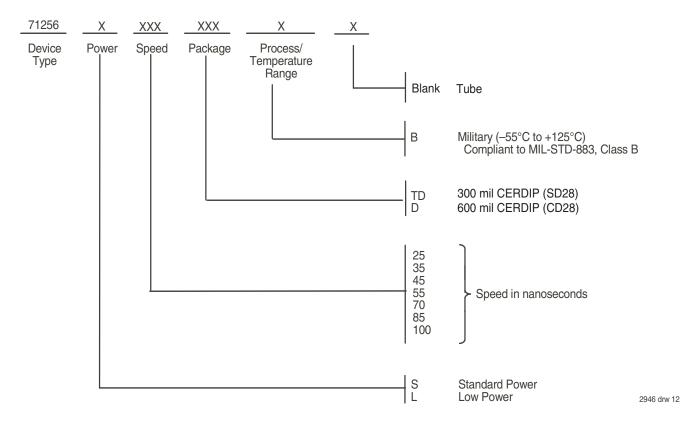
### **Ordering Information — Commercial & Industrial**



#### NOTES:

- 1. Contact your local sales office for Industrial temp range for other speeds, packages and powers.
- 2. Green parts available. For specific speeds, packages and powers contact your local sales office.

### **Ordering Information — Military**



### **Orderable Part Information**

Speed (ns)	Orderable Part ID	Pkg. Code	Pkg. Type	Temp. Grade
20	71256L20YG	PJG28	SOJ	С
	71256L20YG8	PJG28	SOJ	С
	71256L20YGI	PJG28	SOJ	I
	71256L20YGl8	PJG28	SOJ	1
25	71256L25DB	CD28	CDIP	М
	71256L25TDB	SD28	CDIP	М
	71256L25YG	PJG28	SOJ	С
	71256L25YG8	PJG28	SOJ	С
	71256L25YGI	PJG28	SOJ	- 1
	71256L25YGl8	PJG28	SOJ	I
35	71256L35DB	CD28	CDIP	М
	71256L35TDB	SD28	CDIP	М
	71256L35YG	PJG28	SOJ	С
	71256L35YG8	PJG28	SOJ	С
	71256L35YGI	PJG28	SOJ	I
	71256L35YGl8	PJG28	SOJ	I
45	71256L45DB	CD28	CDIP	М
	71256L45TDB	SD28	CDIP	М
55	71256L55DB	CD28	CDIP	М
	71256L55TDB	SD28	CDIP	М
70	71256L70DB	CD28	CDIP	М
	71256L70TDB	SD28	CDIP	М
85	71256L85DB	CD28	CDIP	М
	71256L85TDB	SD28	CDIP	М
100	71256L100DB	CD28	CDIP	М
	71256L100TDB	SD28	CDIP	М

Speed (ns)	Orderable Part ID	Pkg. Code	Pkg. Type	Temp. Grade
25	71256S25DB	CD28	CDIP	М
	71256S25TDB	SD28	CDIP	М
35	71256S35DB	CD28	CDIP	М
	71256S35TDB	SD28	CDIP	М
45	71256S45DB	CD28	CDIP	М
	71256S45TDB	SD28	CDIP	М
55	71256S55DB	CD28	CDIP	М
	71256S55TDB	SD28	CDIP	М
70	71256S70DB	CD28	CDIP	М
	71256S70TDB	SD28	CDIP	М
85	71256S85DB	CD28	CDIP	М
	71256S85TDB	SD28	CDIP	М
100	71256S100DB	CD28	CDIP	М
	71256S100TDB	SD28	CDIP	М

### **Datasheet Document History**

11/4/99:		Updated to new format
	Pg. 1-5, 9	Added Industrial Temperature Range offerings
	Pg. 1	Removed 30, 120, and 150ns military and 45ns commercial speed grade offerings.
	Pg. 2	Removed P28-2 package from DIP/SOJ Top View
	Pg. 3	Removed 30ns and 45ns (Commercial only) speed grade offerings from DC Electrical table
		Revised notes and footnotes
	Pg. 5	Removed 30ns speed grade offering from AC Electrical table
		Revised notes and footnotes
	Pg. 6	Expressed Military Temperature range on AC Electrical table
		Revised notes and footnotes
	Pg. 8	Removed Note 1 and renumbered notes and footnotes
	Pg. 9	Revised Ordering Information and presented by temperature range offering
	Pg. 10	Added Datasheet Document History
08/09/00:		Not recommended for new designs
02/01/01:		Remove "Not recommended for new designs"
11/15/06:	Pg. 3	Changed power limits for commercial and industrial. Refer to PCN SR-0602-03. Added Restricted hazardous substance device to ordering information.
11/01/08:	Pg. 2,9	Corrected typo on pin 21 in 32-Pin LCC diagram. Updated the ordering information by removing the "IDT" notation.
04/28/11:	Pg. 1, 2, 5, 9	Added 20ns to Industrial offering. Obsoleted 28-pin 600 mil, 32-pin LCC and Added Tape and Reel to
00/00/40	D 4	Ordering information and updated description of Restricted hazardous substance device to Green.
09/26/13:	Pg. 1	In the Description: removed IDT's reference to fabrication and removed the sentence "In the full standby
00/00/00	D 4 40	mode, the low-power device consumes less than 15µW, typically".
08/06/20:	Pg. 1 - 12	Rebranded as Renesas datasheet
	Pg.1 & 9	Updated Indusrial temp and green availability
	Pg. 2 & 9	Updated package codes
	Pg. 10	Added Orderable Part Information tables

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### **Corporate Headquarters**

TOYOSU FORESIA, 3-2-24 Toyosu, Koto-ku, Tokyo 135-0061, Japan www.renesas.com

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71256L25YG 71256S85DB 71256L20YG 71256L55DB 71256L35YGI8 71256L100TDB 71256L45DB

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