TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (π -MOSVII)

TK12A53D

Switching Regulator Applications

Unit: mm

• Low drain-source ON-resistance: $R_{DS (ON)} = 0.5 \Omega (typ.)$

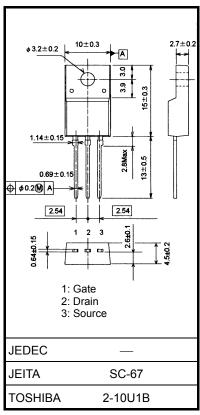
• High forward transfer admittance: $|Y_{fS}| = 6.0 \text{ S (typ.)}$

• Low leakage current: $I_{DSS} = 10 \mu A \text{ (max) (V}_{DS} = 525 \text{ V)}$

• Enhancement mode: V_{th} = 2.0 to 4.0 V (V_{DS} = 10 V, I_D = 1 mA)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit	
Drain-source voltage		V_{DSS}	525	V	
Gate-source voltage		V_{GSS}	±30	V	
Drain current	DC (Note 1)	I _D	12	Α	
	Pulse (Note 1)	I _{DP}	48	ı	
Drain power dissipation	on (Tc = 25°C)	PD	45	W	
Single pulse avalanch	ne energy (Note 2)	E _{AS}	378	mJ	
Avalanche current		I _{AR}	12	Α	
Repetitive avalanche	energy (Note 3)	E _{AR}	4.5	mJ	
Channel temperature		T _{ch}	150	°C	
Storage temperature	range	T _{stg}	-55 to 150	°C	



Weight: 1.7 g (typ.)

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	R _{th (ch-c)}	2.78	°C/W
Thermal resistance, channel to ambient	R _{th (ch-a)}	62.5	°C/W

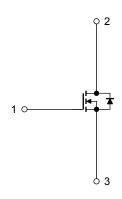
Note 1: Ensure that the channel temperature does not exceed 150°C.

Note 2: V_{DD} = 90 V, T_{ch} = 25°C (initial), L = 4.5 mH, R_{G} = 25 Ω , I_{AR} = 12 A

Note 3: Repetitive rating: pulse width limited by maximum channel temperature

This transistor is an electrostatic-sensitive device. Handle with care.

Internal Connection



Start of commercial production 2008-10

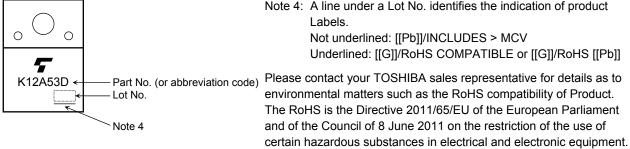
Electrical Characteristics (Ta = 25°C)

Chara	acteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Gate leakage current		I _{GSS}	$V_{GS}=\pm30~V,~V_{DS}=0~V$	_	_	±1	μА
Drain cut-off current		I _{DSS}	V _{DS} = 525 V, V _{GS} = 0 V	_	_	10	μА
Drain-source breakdown voltage		V (BR) DSS	$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	525	_	_	V
Gate threshold vo	oltage	V _{th}	V _{DS} = 10 V, I _D = 1 mA	2.0	_	4.0	V
Drain-source ON	resistance	R _{DS} (ON)	V _{GS} = 10 V, I _D = 6 A	_	0.50	0.58	Ω
Forward transfer	admittance	Y _{fs}	V _{DS} = 10 V, I _D = 6 A	1.5	6.0	_	S
Input capacitance		C _{iss}		_	1350	_	pF
Reverse transfer capacitance		C _{rss}	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz	_	6	_	
Output capacitance		C _{oss}		_	135	_	
Switching time	Rise time	t _r	V_{GS} $V_{DD} \approx 200 \text{ V}$	_	22	_	. ns
	Turn-on time	t _{on}			55		
	Fall time	t _f			15		
	Turn-off time	t _{off}	Duty \leq 1%, $t_W = 10 \mu s$	_	100	_	
Total gate charge		Qg		_	25	_	
Gate-source charge		Q _{gs}	$V_{DD} \approx 400 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 12 \text{ A}$	_	16	_	nC
Gate-drain charge		Q _{gd}		_	9	_	

Source-Drain Ratings and Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Continuous drain reverse current (Note 1)	I _{DR}	_	_	_	12	Α
Pulse drain reverse current (Note 1)	I _{DRP}	_	_	_	48	Α
Forward voltage (diode)	V_{DSF}	I _{DR} = 12 A, V _{GS} = 0 V	_	_	-1.7	٧
Reverse recovery time	t _{rr}	I _{DR} = 12 A, V _{GS} = 0 V,	_	1300	_	ns
Reverse recovery charge	Q _{rr}	dI _{DR} /dt = 100 A/μs	_	12	_	μС

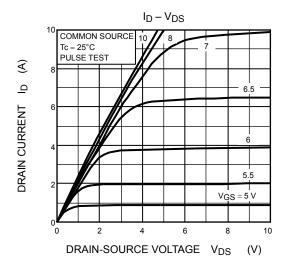
Marking

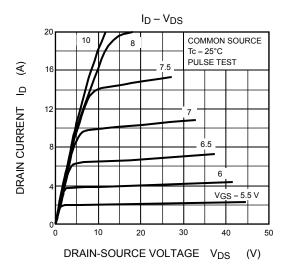


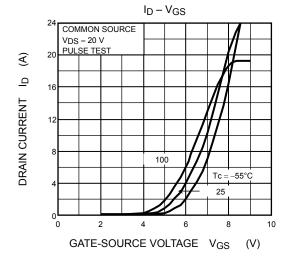
Note 4: A line under a Lot No. identifies the indication of product

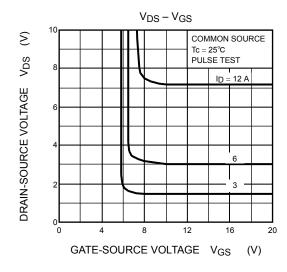
Not underlined: [[Pb]]/INCLUDES > MCV Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

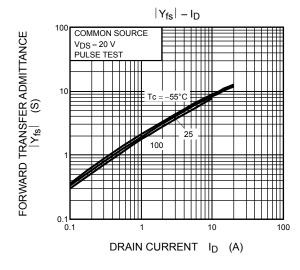
Part No. (or abbreviation code) Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is the Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of

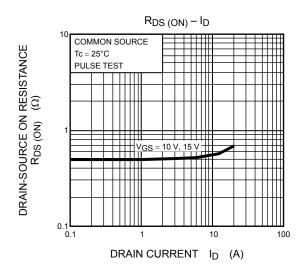


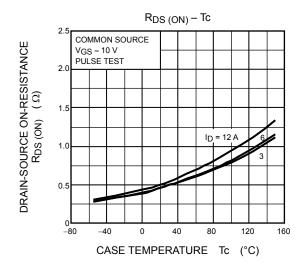


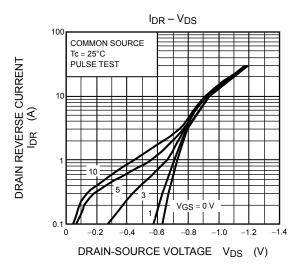


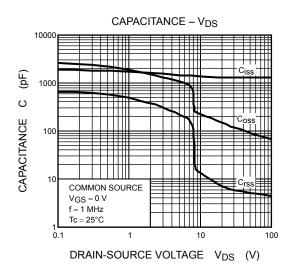


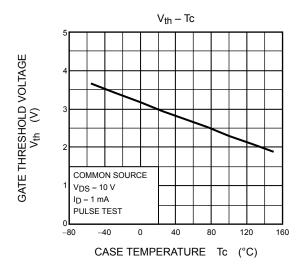


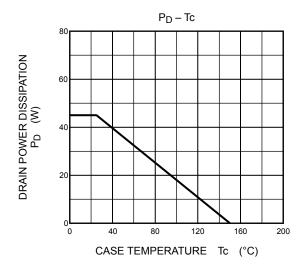


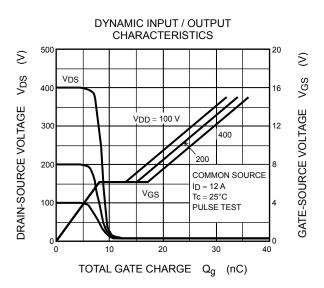


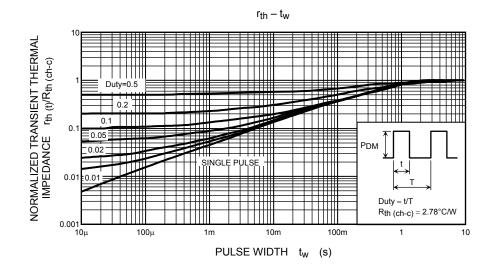


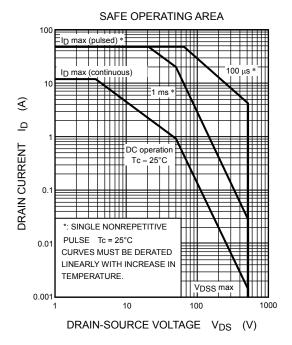


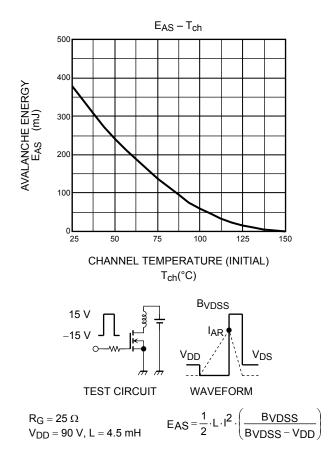












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