

Under Development

TOSHIBA Field Effect Transistor
Silicon N Channel MOS Type**SSM3K12T**

The information contained herein is subject to change without notice;
likewise, product development may be discontinued.

DC-DC Converter

High Speed Switching Applications

- Small Package
- Low ON-resistance : $R_{on} = 95 \text{ m}\Omega$ (max) (@ $V_{GS} = 10 \text{ V}$)
: $R_{on} = 145 \text{ m}\Omega$ (max) (@ $V_{GS} = 4.5 \text{ V}$)
- High speed : $t_{on} = 23 \text{ ns}$
: $t_{off} = 13 \text{ ns}$

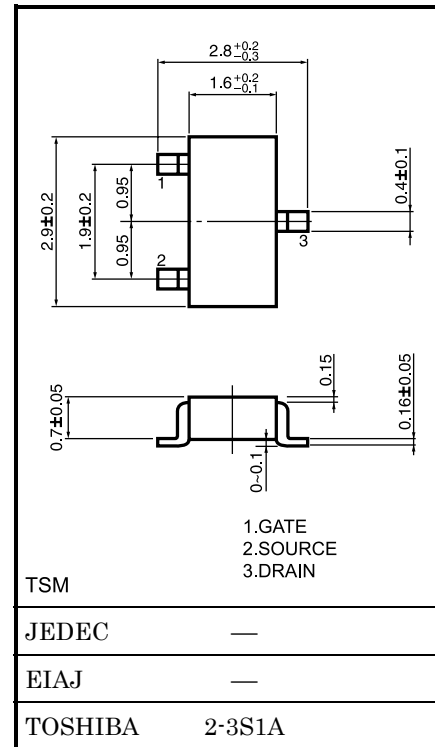
Maximum Ratings ($T_a = 25^\circ\text{C}$)

Characteristic		Symbol	Rating	Unit
Drain-Source voltage		V_{DS}	30	V
Gate-Source voltage		V_{GSS}	± 20	V
Drain current	DC	I_D	3.0	A
	Pulse	I_{DP} (Note2)	6.0	
Drain power dissipation ($T_a = 25^\circ\text{C}$)		P_D (Note1)	1250	mW
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	$-55 \sim 150$	$^\circ\text{C}$

Note1: Mounted on FR4 board
(25.4 mm \times 25.4 mm \times 1.6 t, Cu pad: 645 mm², t = 10 s)

Note2: The pulse width limited by max channel temperature.

Unit in: mm



Weight: 10 mg

Handling Precaution

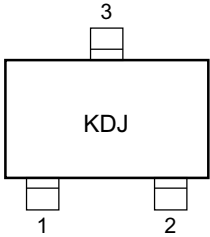
When handling individual devices (which are not yet mounted on a circuit board), be sure that the environment is protected against electrostatic electricity. Operators should wear anti-static clothing, and containers and other objects that come into direct contact with devices should be made of anti-static materials.

The Channel-to-Ambient thermal resistance $R_{th(ch-a)}$ and the drain power dissipation P_D vary according to the board material, board area, board thickness and pad area, and are also affected by the environment in which the product is used. When using this device, please take heat dissipation fully into account.

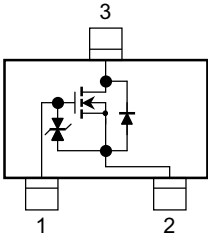
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Marking



Equivalent Circuit



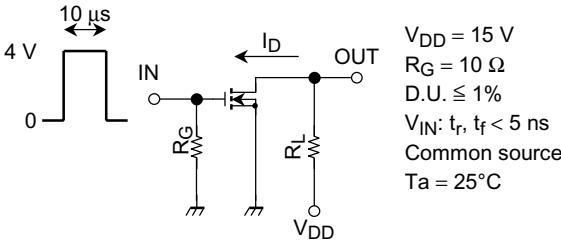
Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I _{GSS}	V _{GS} = ±16 V, V _{DS} = 0	—	—	±1	μA
Drain-Source breakdown voltage		V _{(BR) DSS}	I _D = 1 mA, V _{GS} = 0	30	—	—	V
Drain Cut-off current		I _{DSS}	V _{DS} = 30 V, V _{GS} = 0	—	—	1	μA
Gate threshold voltage		V _{th}	V _{DS} = 5 V, I _D = 0.1 mA	1.1	—	1.8	V
Forward transfer admittance		Y _{fs}	V _{DS} = 5 V, I _D = 1.5 A (Note3)	1.8	3.6	—	S
Drain-Source ON resistance		R _{DS (ON)}	I _D = 1.5 A, V _{GS} = 10 V (Note3)	—	73	95	mΩ
			I _D = 1.5 A, V _{GS} = 4.5 V (Note3)	—	105	145	
			I _D = 1.5 A, V _{GS} = 4.0 V (Note3)	—	120	175	
Input capacitance		C _{iss}	V _{DS} = 15 V, V _{GS} = 0, f = 1 MHz	—	127	—	pF
Reverse transfer capacitance		C _{rss}	V _{DS} = 15 V, V _{GS} = 0, f = 1 MHz	—	22	—	pF
Output capacitance		C _{oss}	V _{DS} = 15 V, V _{GS} = 0, f = 1 MHz	—	72	—	pF
Switching time	Rise time	t _r	V _{DD} = 15 V, I _D = 1.5 mA V _{GS} = 0~4 V, R _G = 10 Ω	—	17	—	ns
	Turn-on time	t _{on}		—	23	—	
	Fall time	t _f		—	4.3	—	
	Turn-off time	t _{off}		—	13	—	

Note3: Pulse test

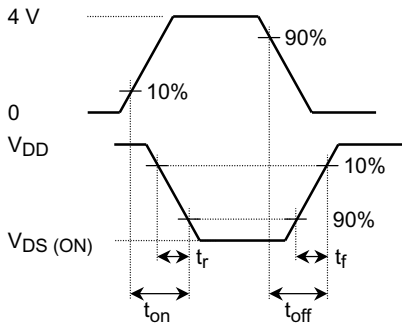
Switching Time Test Circuit

(a) Test circuit



(b) V_{IN}

(c) V_{OUT}



Precaution

V_{th} can be expressed as voltage between gate and source when low operating current value is $I_D = 100\ \mu\text{A}$ for this product. For normal switching operation, $V_{GS(ON)}$ requires higher voltage than V_{th} and $V_{GS(OFF)}$ requires lower voltage than V_{th} .

(relationship can be established as follows: $V_{GS(OFF)} < V_{th} < V_{GS(ON)}$)

Please take this into consideration for using the device.

V_{GS} recommended voltage of 4 V or higher to turn on this product.