

Under Development

TOSHIBA Field Effect Transistor
Silicon N Channel MOS Type (Lateral)

SSM3K11T

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

DC-DC Converter

High Speed Switching Applications

- Ultra-high-speed switching achieved using a lateral structure
 $t_{on} = 6.4 \text{ ns}$, $t_{off} = 4.9 \text{ ns}$
- Low reverse transfer capacitance: $C_{rss} = 6.8 \text{ pF (typ.)}$
- Thin package
- Low ON-resistance: $R_{DS(ON)} = 1.2 \Omega \text{ (typ.) @ } V_{GS} = 2.5 \text{ V}$
- Direct drive by CMOS possible

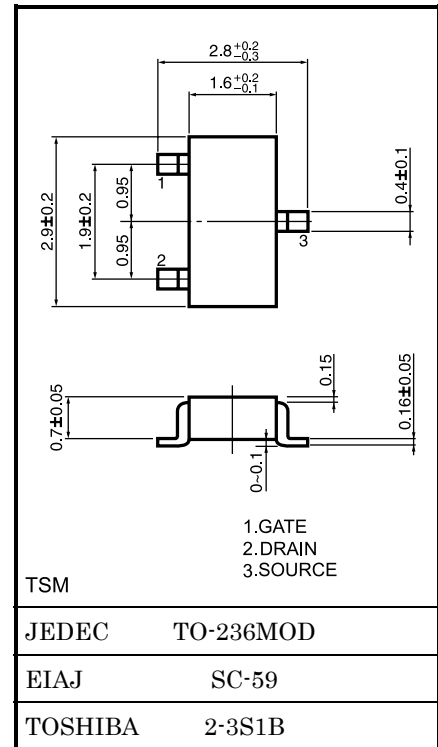
Maximum Ratings ($T_a = 25^\circ\text{C}$)

Characteristic	Symbol	Rating	Unit
Drain-Source voltage	V_{DS}	40	V
Gate-Source voltage	V_{GSS}	± 10	V
Drain current	DC	I_D	500 mA
	Pulse	I_{DP} (Note2)	2 A
Drain power dissipation	P_D (Note1)	1250	mW
Channel temperature	T_{ch}	150	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55~150	$^\circ\text{C}$

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

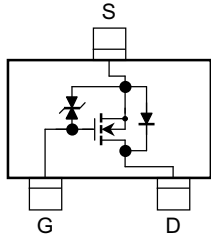
Handling Precaution

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.

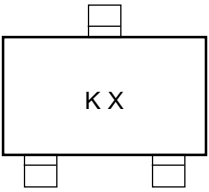
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Equivalent Circuit



Marking



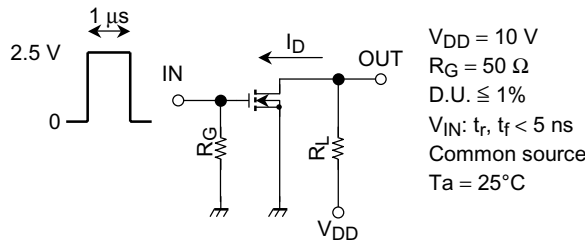
Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 10\text{ V}, V_{DS} = 0$	—	—	± 0.1	μA
Drain-Source breakdown voltage		$V_{(BR)DSS}$	$I_D = 1\text{ mA}, V_{GS} = 0$	40	—	—	V
Drain Cut-off current		I_{DSS}	$V_{DS} = 40\text{ V}, V_{GS} = 0$	—	—	1	μA
Gate threshold voltage		V_{th}	$V_{DS} = 3\text{ V}, I_D = 0.1\text{ mA}$	0.8	—	1.4	V
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 3\text{ V}, I_D = 500\text{ mA}$ (Note3)	0.55	1.1	—	S
Drain-Source ON resistance		$R_{DS(ON)}$	$I_D = 250\text{ mA}, V_{GS} = 2.5\text{ V}$ (Note3)	—	1.2	1.8	Ω
			$I_D = 500\text{ mA}, V_{GS} = 4\text{ V}$ (Note3)	—	1.0	1.3	
Input capacitance		C_{iss}	$V_{DS} = 3\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	64	—	pF
Reverse transfer capacitance		C_{rss}	$V_{DS} = 3\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	6.8	—	pF
Output capacitance		C_{oss}	$V_{DS} = 3\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	38	—	pF
Switching time	Rise time	t_r	$V_{DD} = 10\text{ V}, I_D = 250\text{ mA}$ $V_{GS} = 0 \sim 2.5\text{ V}$	—	2.9	—	ns
	Turn-on time	t_{on}		—	6.4	—	
	Fall time	t_f		—	2.1	—	
	Turn-off time	t_{off}		—	4.9	—	

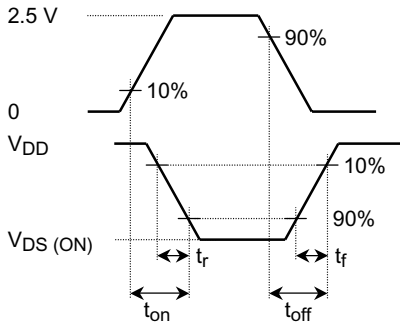
Note3: Pulse test

Switching Time Test Circuit

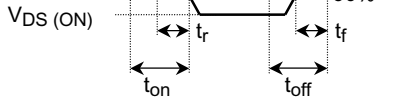
(a) Test circuit



(b) VIN



(c) VOUT



Precaution

V_{th} can be expressed as voltage between gate and source when low operating current value is $I_D = 100\text{ }\mu\text{A}$ 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 2.5 V or higher to turn on this product.