TOSHIBA Field Effect Transistor Silicon N Channel MOS Type

SSM3K09FU

High Speed Switching Applications

Unit: mm

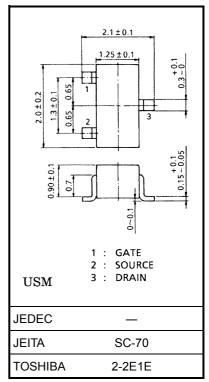
- Small package
- Low on resistance
 - : $R_{on} = 0.7 \Omega \text{ (max) } (@V_{GS} = 10 \text{ V})$
 - : $R_{on} = 1.2 \Omega \text{ (max) } (@V_{GS} = 4 \text{ V})$

Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit	
Drain-Source voltage		V_{DS}	30	V	
Gate-Source voltage		V_{GSS}	±20	V	
Drain current	DC	I _D	400	mA	
	Pulse	I _{DP}	800		
Drain power dissipation (Ta = 25°C)		P _D (Note1)	150	mW	
Channel temperature		T _{ch}	150	°C	
Storage temperature		T _{stg}	-55~150	°C	

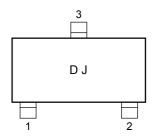
Note1: Mounted on FR4 board

(25.4 mm \times 25.4 mm \times 1.6 t, Cu Pad: 0.6 mm² \times 3) Figure 1.



Weight: 0.006 g (typ.)

Marking



Equivalent Circuit (top view)

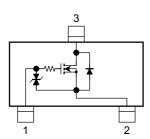
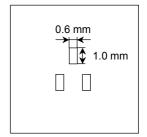


Figure 1: 25.4 mm \times 25.4 mm \times 1.6 t, Cu Pad: 0.6 mm² \times 3



Handling Precaution

When handling individual devices (which are not yet mounting 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.

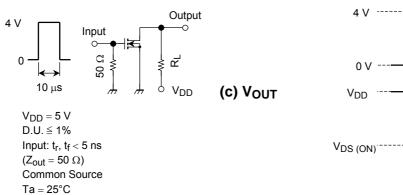
Electrical Characteristics (Ta = 25°C)

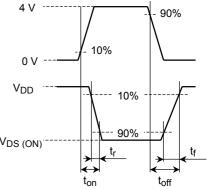
Chara	cteristics	Symbol	Test Condition		Min	Тур.	Max	Unit
Gate leakage current I_{GSS} $V_{GS} = \pm 16 \text{ V}, V_{DS}$		$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0$		_	_	±1	μΑ	
Drain-Source brea	akdown voltage	V (BR) DSS	$I_D = 1 \text{ mA}, V_{GS} = 0$		30	_	_	V
Drain cut-off curre	cut-off current I_{DSS} $V_{DS} = 30 \text{ V}, V_{GS} = 0$			_	_	1	μА	
Gate threshold vo	Itage	V _{th}	$V_{DS} = 5 \text{ V}, I_{D} = 0.1 \text{ mA}$		1.1	_	1.8	V
Forward transfer a	admittance	Y _{fs}	$V_{DS} = 5 \text{ V}, I_{D} = 200 \text{ mA}$	(Note2)	270	_	_	mS
Drain-Source ON resistance		R _{DS} (ON)	$I_D = 200 \text{ mA}, V_{GS} = 10 \text{ V}$	(Note2)	_	0.5	0.7	Ω
			I _D = 200 mA, V _{GS} = 4 V	(Note2)	_	0.8	1.2	
			$I_D = 200 \text{ mA}, V_{GS} = 3.3 \text{ V}$	(Note2)	_	1.0	1.7	
Input capacitance		C _{iss}	$V_{DS} = 5 \text{ V}, V_{GS} = 0, f = 1 \text{ MHz}$		_	20	_	pF
Reverse transfer capacitance		C _{rss}	$V_{DS} = 5 \text{ V}, V_{GS} = 0, f = 1 \text{ MHz}$		_	7	_	pF
Output capacitance		Coss	$V_{DS} = 5 \text{ V}, V_{GS} = 0, f = 1 \text{ MHz}$		_	16	_	pF
Switching time	Turn-on time	t _{on}	$V_{DD} = 5 \text{ V}, I_D = 200 \text{ mA},$		_	72	_	ns
	Turn-off time	t _{off}	V _{GS} = 0~4 V		_	68	_	ns

Note2: Pulse test

Switching Time Test Circuit







Precaution

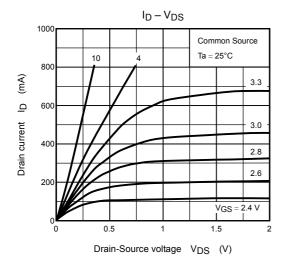
 V_{th} can be expressed as voltage between gate and source when low operating current value is I_D = 100 μA for this product. For normal switching operation, V_{GS} (on) requires higher voltage than V_{th} and V_{GS} (off) requires lower voltage than V_{th} .

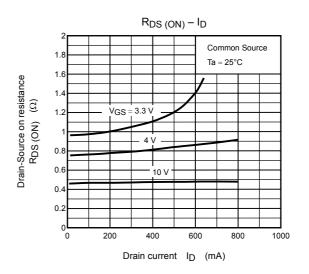
2

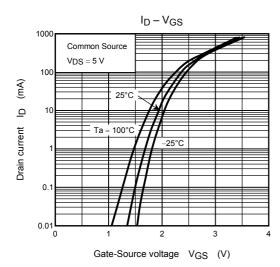
(relationship can be established as follows: $V_{GS (off)} < V_{th} < V_{GS (on)}$)

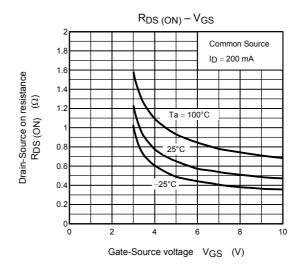
Please take this into consideration for using the device.

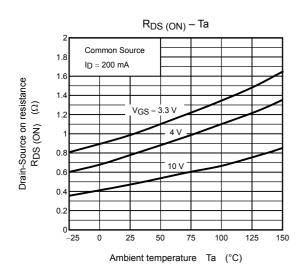
 $\ensuremath{V_{\mathrm{GS}}}$ recommended voltage of 4.0 V or higher to turn on this product.

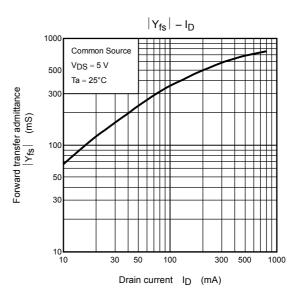


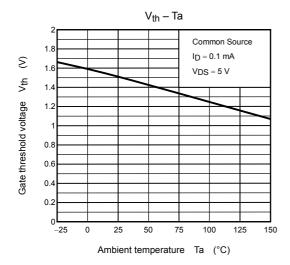


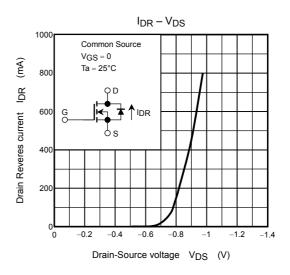


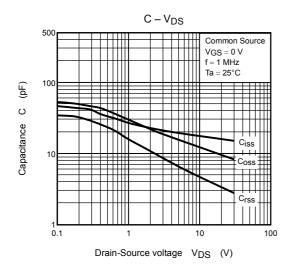


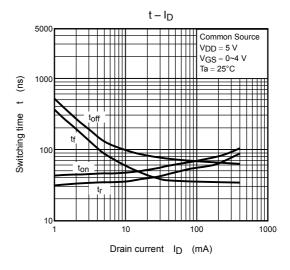


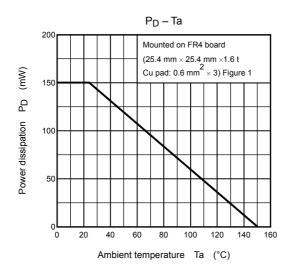












4

RESTRICTIONS ON PRODUCT USE

000707EAA

- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The information contained herein is presented only as a guide for the applications of our products. No
 responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other
 rights of the third parties which may result from its use. No license is granted by implication or otherwise under
 any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.