Unit: mm

TOSHIBA Field-Effect Transistor Silicon P-Channel MOS Type (U-MOSVI)

SSM3J130TU

O Power Management Switch Applications

1.5 V drive

• Low ON-resistance: $R_{DS(ON)}$ = 63.2 m Ω (max) (@V_{GS} = -1.5 V)

 $R_{DS(ON)} = 41.1 \text{ m}\Omega \text{ (max) } (@V_{GS} = -1.8 \text{ V})$

 $R_{DS(ON)} = 31.0 \text{ m}\Omega \text{ (max) (@V_{GS} = -2.5 V)}$

 $R_{DS(ON)} = 25.8 \text{ m}\Omega \text{ (max) } (@V_{GS} = -4.5 \text{ V})$

Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit	
Drain-Source voltage		V _{DSS}	-20	V	
Gate-Source voltage		V_{GSS}	± 8	V	
Drain current	DC	I _D	-4.4	Α	
	Pulse	I _{DP}	-8.8	ζ.	
Drain power dissipation		P _D (Note 1)	800	mW	
		P _D (Note 2)	500		
Channel temperature		T _{ch}	150	°C	
Storage temperature range		T _{stg}	-55 to 150	°C	

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).

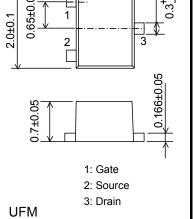
Note 1: Mounted on a ceramic board.

 $(25.4 \text{ mm} \times 25.4 \text{ mm} \times 0.8 \text{ mm}, \text{ Cu Pad: } 645 \text{ mm}^2)$

Note 2: Mounted on an FR4 board.

 $(25.4 \text{ mm} \times 25.4 \text{ mm} \times 1.6 \text{ mm}, \text{ Cu Pad: } 645 \text{ mm}^2)$

2.1±0.1 1.7±0.1 1.00



2-2U1A

Weight: 6.6 mg (typ.)

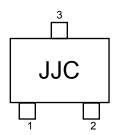
JEDEC

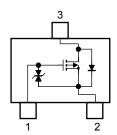
JEITA

TOSHIBA

Marking

Equivalent Circuit (top view)





Electrical Characteristics (Ta = 25°C)

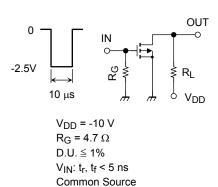
Chara	cteristic	Symbol	Test Conditions		Min	Тур.	Max	Unit
Drain Source breakdown voltage	V _{(BR)DSS}	$I_D = -1 \text{ mA}, V_{GS} = 0 \text{ V}$		-20	_	_	V	
Drain-Source breakdown voltage		V (BR) DSX	I _D = -1 mA, V _{GS} = 5 V	(Note 4)	-15	_		_
Drain cut-off curre	nt	I _{DSS}	V _{DS} = -20 V, V _{GS} = 0 V		_	_	-1	μΑ
Gate leakage curre	ent	I _{GSS}	$V_{GS} = \pm 8 \text{ V}, V_{DS} = 0 \text{ V}$		_	_	±1	μΑ
Gate threshold vol	tage	V _{th}	$V_{DS} = -3 \text{ V}, I_{D} = -1 \text{ mA}$		-0.3	_	-1.0	V
Forward transfer a	dmittance	Y _{fs}	V _{DS} = -3 V, I _D = -2.0 A	(Note 3)	8.8	17.5	_	S
Drain-source ON-resistance		I _D = -4.0 A, V _{GS} = -4.5 V	(Note 3)	_	20.9	25.8	mΩ	
	D	I _D = -4.0 A, V _{GS} = -2.5 V	(Note 3)	_	24.2	31.0		
	R _{DS} (ON)	I _D = -2.5 A, V _{GS} = -1.8 V	(Note 3)	_	28.8	41.1		
		I _D = -1.5 A, V _{GS} = -1.5 V	(Note 3)	_	32.4	63.2		
Input capacitance Output capacitance		C _{iss}	V _{DS} = -10 V, V _{GS} = 0 V f = 1 MHz		_	1800	_	pF
		Coss			_	205	_	
Reverse transfer capacitance		C _{rss}	11 - 1 WITZ		_	190	_	
Switching time	Turn-on time	t _{on}	V_{DD} = -10 V, I_{D} = -1.5 A V_{GS} = 0 to -2.5 V, R_{G} = 4.7 Ω		_	25	_	20
	Turn-off time	t _{off}			_	133	_	ns
Total Gate Charge	;	Qg	V 10 V I 11 A		_	24.8	—	
Gate-Source Charge		Q _{gs}	V _{DS} = -10 V, I _{DS} = -4.4 A, V _{GS} =-4.5 V		_	<u> </u>	_	nC
Gate-Drain Charge		Q _{gd}			_	6.8	_	
Drain-Source forw	ard voltage	V _{DSF}	I _D = 4.4 A, V _{GS} = 0 V	(Note 3)	_	0.83	1.2	V

Note3: Pulse test

Note4: V_{DSX} mode (the application of a plus voltage between gate and source) may cause decrease in maximum rating of drain-source voltage.

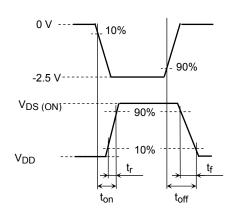
Switching Time Test Circuit





(b) V_{IN}

(c) Vout



Usage Considerations

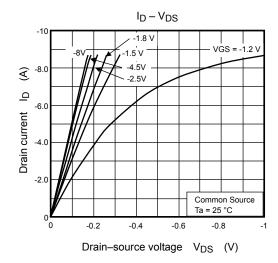
Ta = 25°C

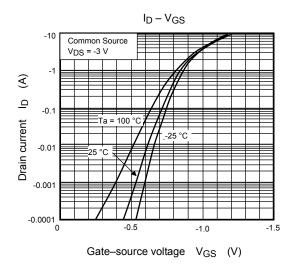
Let V_{th} be the voltage applied between gate and source that causes the drain current (I_D) to below –1 mA for the SSM3J130TU. Then, for normal switching operation, $V_{GS(on)}$ must be higher than V_{th} , and $V_{GS(off)}$ must be lower than V_{th} . This relationship can be expressed as: $V_{GS(off)} < V_{th} < V_{GS(on)}$.

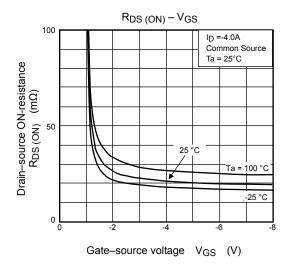
Take this into consideration when using the device.

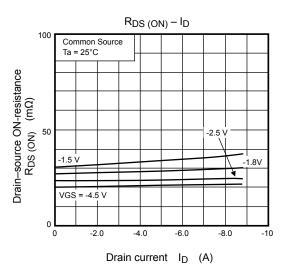
Handling Precaution

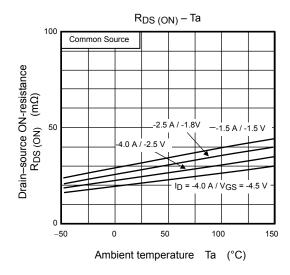
When handling individual devices that are not yet mounted on a circuit board, make sure that the environment is protected against electrostatic discharge. Operators should wear antistatic clothing, and containers and other objects that come into direct contact with devices should be made of antistatic materials.

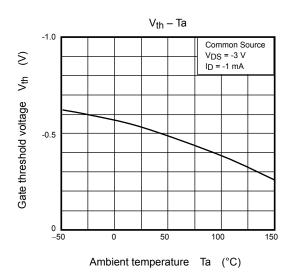


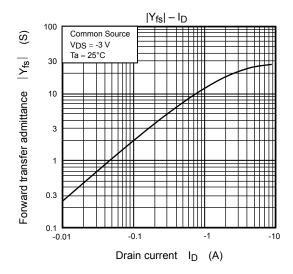


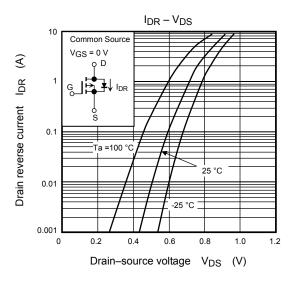


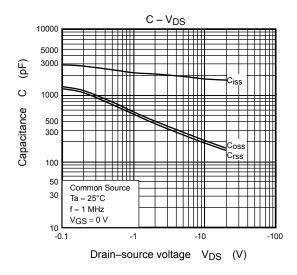


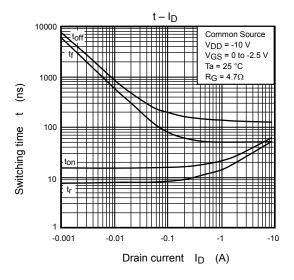


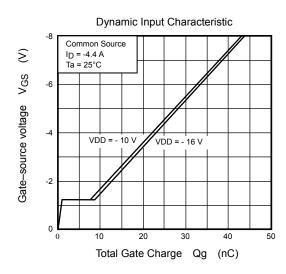


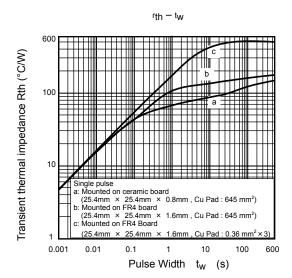


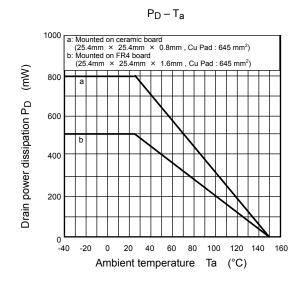












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