TOSHIBA Field Effect Transistor Silicon P-Channel MOS Type (π-MOSV)

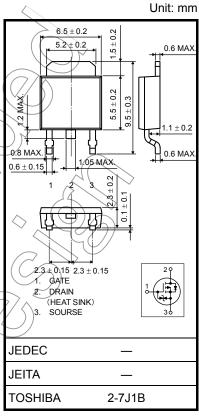
## **2SJ610**

# Switching Regulator, DC/DC Converter and Motor Drive Applications

- Low drain-source ON-resistance:  $R_{DS}$  (ON) = 1.85  $\Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fS}| = 18 \text{ S (typ.)}$
- Low leakage current: I<sub>DSS</sub> = -100 μA (V<sub>DS</sub> = -250 V)
- Enhancement mode:  $V_{th} = -1.5$  to -3.5 V ( $V_{DS} = 10$  V,  $I_{D} = 1$  mA)

### Absolute Maximum Ratings (Ta = 25°C)

Charact	eristic	Symbol	Rating	Unit
Drain-source voltage		$V_{DSS}$	-250	$(\sqrt{y})$
Drain-gate voltage ( $R_{GS} = 20 \text{ k}\Omega$ )		$V_{DGR}$	-250	V
Gate-source voltage		$V_{GSS}$	±20	V
Drain current	DC (Note 1)	ID	-2.0	$\supset$
	Pulse (t = 1 ms) (Note 1)	I <sub>DP</sub>	4.0	Α
Drain power dissipat	ion	P <sub>D</sub>	20	VV
Single-pulse avaland	che energy (Note 2)	E <sub>AS</sub>	180	mJ
Avalanche current		IAR	)) –2.0	Α
Repetitive avalanche	e energy (Note 3)	EAR	2.0	mJ
Channel temperature	е	(T <sub>ch</sub> )	150	/%C
Storage temperature	range	Tstg	-55 to 150	\rightarrow c



Weight: 0.36 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

Characteristic	Symbol	Max	Unit
Thermal resistance, channel to case	Rth (ch-c)	6.25	°C/W
Thermal resistance, channel to ambient	Rth (ch-a)	125	°C/W

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

Note 2: V<sub>DD</sub> = –50 V, T<sub>Ch</sub> = 25°C (initial), L = 75 mH, I<sub>AR</sub> = –2.0 A, R<sub>G</sub> = 25  $\Omega$ 

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

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

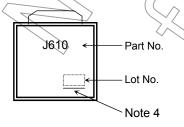
## **Electrical Characteristics (Ta = 25°C)**

Char	acteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Gate leakage cui	rent	I <sub>GSS</sub>	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0 \text{ V}$	_	_	±10	μΑ
Drain cutoff curre	ent	I <sub>DSS</sub>	V <sub>DS</sub> = -250 V, V <sub>GS</sub> = 0 V	_	_	-100	μА
Drain-source bre	akdown voltage	V (BR) DSS	$I_D = -10 \text{ mA}, V_{GS} = 0 \text{ V}$	-250	_	_	V
Gate threshold ve	oltage	V <sub>th</sub>	$V_{DS} = -10 \text{ V}, I_D = -1 \text{ mA}$	1.5	_	-3.5	V
Drain-source ON	-resistance	R <sub>DS</sub> (ON)	$V_{GS} = -10 \text{ V}, I_D = -1.0 \text{ A}$	(E)	) 1.85	2.55	Ω
Forward transfer	admittance	Y <sub>fs</sub>	$V_{DS} = -10 \text{ V}, I_D = -1.0 \text{ A}$	0.5	1.8	_	S
Input capacitance		C <sub>iss</sub>		$\rightarrow$	381	_	
Reverse transfer capacitance		C <sub>rss</sub>	$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		52	_	pF
Output capacitance		C <sub>oss</sub>		<u> </u>	157	_	
Switching time	Rise time	t <sub>r</sub>	10 V VOUT	_	5	//	
	Turn-on time	t <sub>on</sub>	V <sub>GS</sub> 0 V R <sub>L</sub> = 100 Ω V V <sub>DD</sub> ≈ 100 V	-(	20	>	- ns
	Fall time	t <sub>f</sub>			56	/ _	
	Turn-off time	t <sub>off</sub>	Duty ≤1%, t <sub>W</sub> = 10 μs	2	36	_	
Total gate charge Qg		V-200 V Vas 10 V	) —	24	_		
Gate-source charge Q <sub>gs</sub>		$V_{DD} \approx -200 \text{ V}, V_{GS} = -10 \text{ V},$ $I_{D} = -2.0 \text{ A}$	_	11	_	nC	
Gate-drain charge Qgd		Qgd	1D2.0 M	_	13	_	

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

Characteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Continuous drain reverse current (Note 1)	)) I <sub>DR</sub>		_	_	-2.0	Α
Pulse drain reverse current (Note 1)	IDRP		_	_	-4.0	Α
Forward voltage (diode)	V <sub>DSF</sub>	1 <sub>DR</sub> = -2.0 A, V <sub>GS</sub> = 0 V	_	_	2.0	V
Reverse recovery time	t <sub>rr</sub>	$I_{DR} = -2.0 \text{ A}, V_{GS} = 0 \text{ V},$	_	120	_	ns
Reverse recovery charge	Qrr	dI <sub>DR</sub> /dt = 100 A/μs	_	540	_	nC

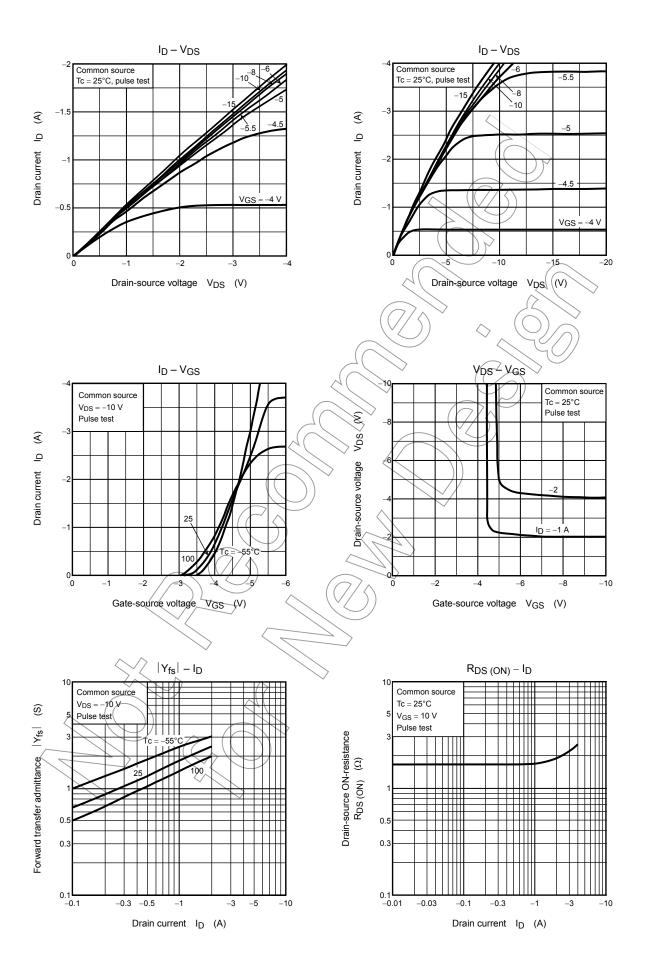
#### Marking

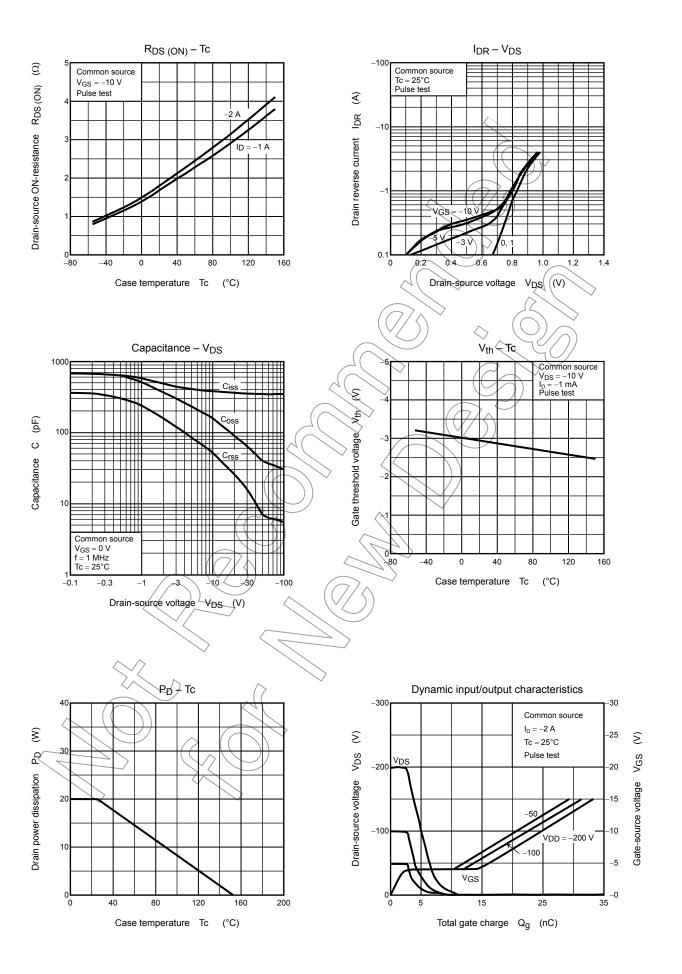


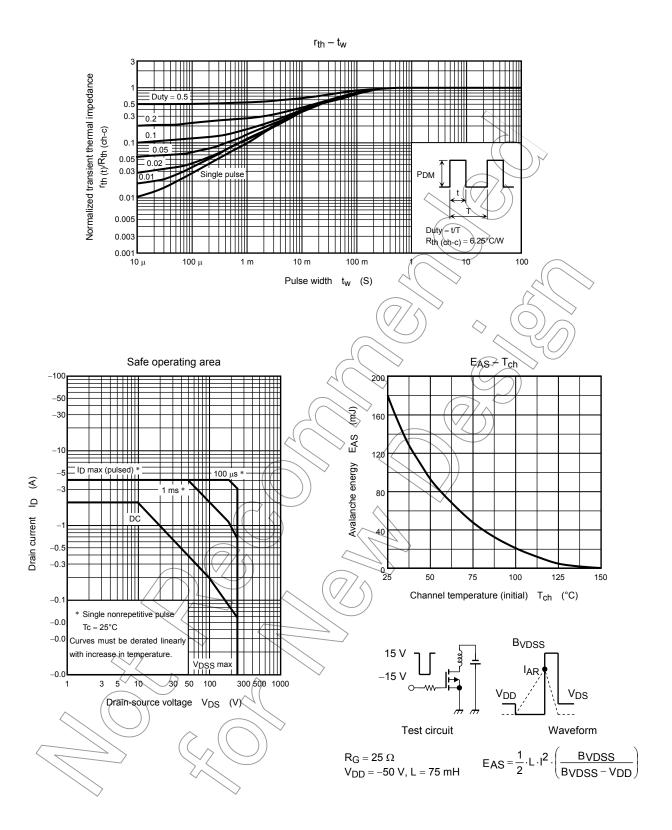
Note 4 : A line under a Lot No. identifies the indication of product Labels [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

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