TOSHIBA Field Effect Transistor Silicon P-Channel MOS Type ( $\pi$ -MOSV)

# 2SJ439

DC/DC Converter, Relay Drive and Motor Drive Applications

- 2.5-V gate drive
- Low drain-source ON-resistance :  $R_{DS (ON)} = 0.18 \Omega$  (typ.)
- High forward transfer admittance  $: |Y_{fs}| = 6.0 \text{ S (typ.)}$
- Low leakage current :  $I_{DSS} = -100 \ \mu A \ (max) \ (V_{DS} = -16 \ V)$
- Enhancement mode :  $V_{th} = -0.5 \sim -1.1 \text{ V} (V_{DS} = -10 \text{ V}, I_D = -1 \text{ mA})$

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

Characteristic		Symbol	Rating	Unit
Drain-source voltage		V <sub>DSS</sub>	-16	V
Drain-gate voltage (R <sub>GS</sub> = 20 kΩ)		V <sub>DGR</sub>	-16	V
Gate-source voltage		V <sub>GSS</sub>	±8	V
Drain current	DC (Note 1)	۱ <sub>D</sub>	-5	А
	Pulse(Note 1)	I <sub>DP</sub>	-20	A
Drain power dissipation (Tc = 25°C)		PD	20	W
Channel temperature		T <sub>ch</sub>	150	°C
Storage temperature range		T <sub>stg</sub>	-55~150	°C

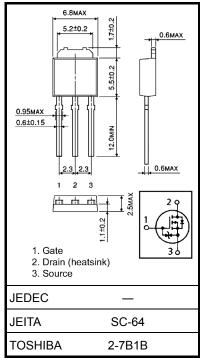
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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.).

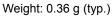
#### **Thermal Characteristics**

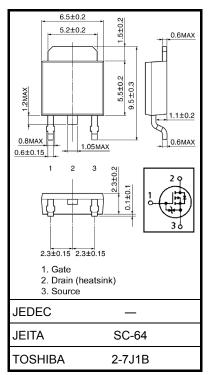
Characteristic	Symbol	Мах	Unit
Thermal resistance, channel to case	R <sub>th (ch-c)</sub>	6.25	°C / W
Thermal resistance, channel to ambient	R <sub>th (ch−a)</sub>	125	°C / W

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

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







Weight: 0.36 g (typ.)

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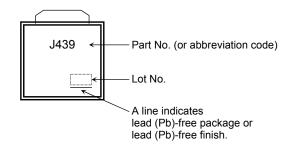
Electrical Characteristics (Ta = 25°C)

Chara	cteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Gate leakage cu	te leakage current $I_{GSS}$ $V_{GS}$ = ±6.5 V, $V_{DS}$ = 0 V		_		±10	μA	
Drain cutoff curr	ent	IDSS	$V_{DS}$ = -16 V, $V_{GS}$ = 0 V	_	_	-100	μA
Drain-source br	eakdown voltage	V (BR) DSS	I <sub>D</sub> = -10 mA, V <sub>GS</sub> = 0 V	-16	_	_	V
Gate threshold v	voltage	V <sub>th</sub>	$V_{DS} = -10 \text{ V}, \text{ I}_{D} = -1 \text{ mA}$	-0.5		-1.1	V
Drain-source ON-resistance		R <sub>DS (ON)</sub>	$V_{GS}$ = -2.5 V, I <sub>D</sub> = -2.5 A		0.18	0.28	Ω
			V <sub>GS</sub> = -4 V, I <sub>D</sub> = -2.5 A		0.14	0.2	12
Forward transfe	r admittance	Y <sub>fs</sub>	V <sub>DS</sub> = -10 V, I <sub>D</sub> = -2.5 A	3.0	6.0		S
Input capacitance	ce	C <sub>iss</sub>			1050		
Reverse transfer capacitance		C <sub>rss</sub>	V <sub>DS</sub> = -10 V, V <sub>GS</sub> = 0 V, f = 1 MHz		120		pF
Output capacitance		C <sub>oss</sub>	1		460		
Switching time	Rise time	tr	$V_{GS} \stackrel{0V}{\longrightarrow} I_{D} = -2.5A$ $V_{GS} \stackrel{0V}{\longrightarrow} I_{D} = -2.5A$ $V_{OUT} \stackrel{V}{\longrightarrow} V_{OUT}$ $R_{L} = 3.2\Omega$ $V_{DD} = -8V$	_	80	_	
	Turn-on time	t <sub>on</sub>		_	100	_	20
	Fall time	t <sub>f</sub>		_	250	_	ns
	Turn-off time	t <sub>off</sub>	$v_{DD} = -8v$ Duty \le 1\%, t <sub>w</sub> = 10\\mu s		550		
Total gate charge (Gate-source plus gate-drain)		Qg		_	24	_	
Gate-source charge		Q <sub>gs</sub>	$V_{\text{DD}}$ ≈ −16 V, $V_{\text{GS}}$ = −5 V, $I_{\text{D}}$ = −5 A		16	_	nC
Gate-drain ("Miller") charge		Q <sub>gd</sub>	]	_	8	_	

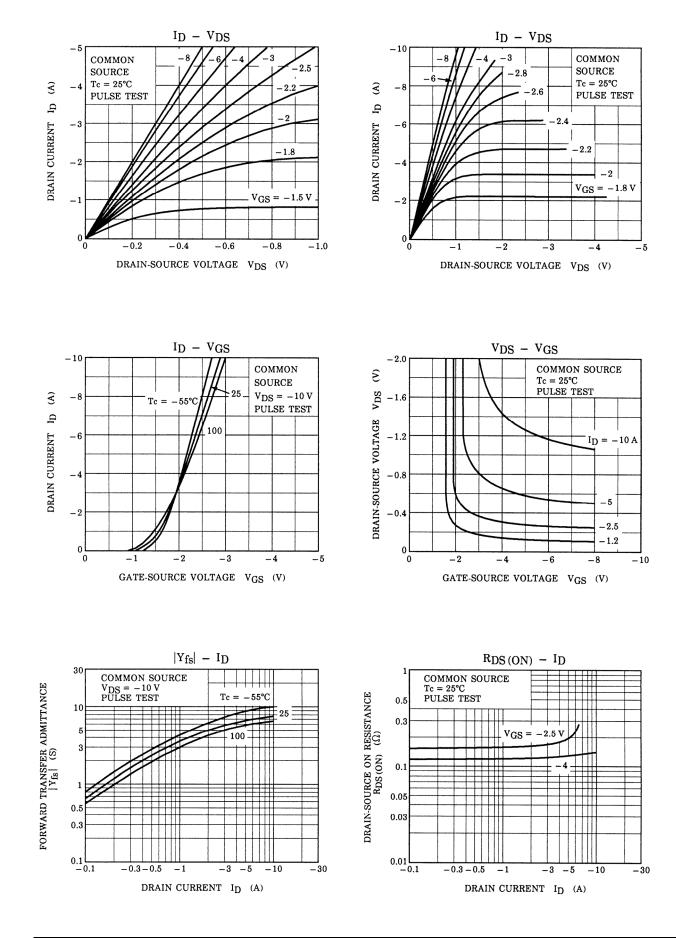
## Source–Drain Ratings and Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Continuous drain reverse current (Note 1)	I <sub>DR</sub>	—	_	_	-5	А
Pulse drain reverse current (Note 1)	I <sub>DRP</sub>	—	_	_	-20	А
Forward voltage (diode)	V <sub>DSF</sub>	I <sub>DR</sub> = -5 A, V <sub>GS</sub> = 0 V	_	_	1.7	V
Reverse recovery time	t <sub>rr</sub>	I <sub>DR</sub> = −5 A, V <sub>GS</sub> = 0 V,dI <sub>DR</sub> / dt = 50 A / µs	_	120	-	ns
Reverse recovery charge	Qrr	$\mu_{\text{R}} = -3$ A, $\nu_{\text{GS}} = 0$ V, $\mu_{\text{R}}$	_	0.12	_	μC

## Marking



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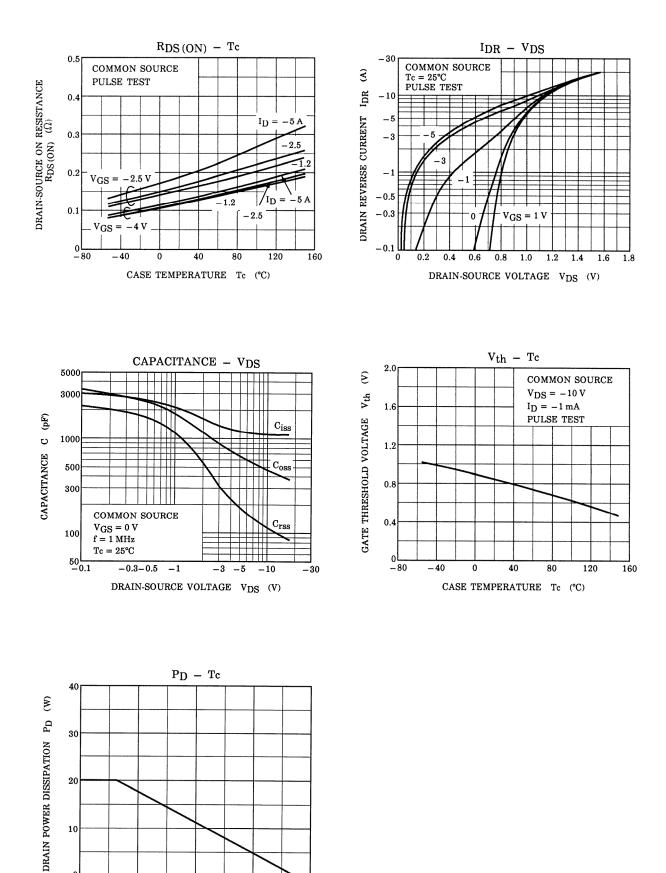
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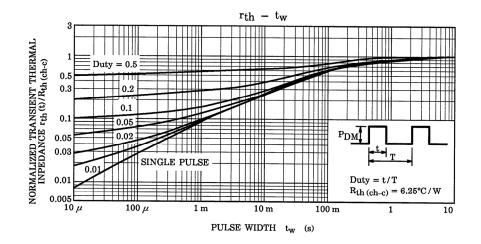
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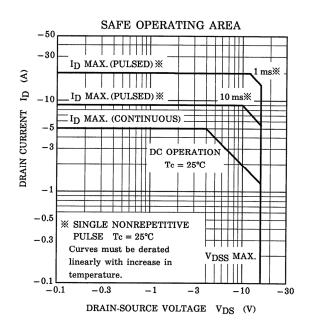
CASE TEMPERATURE Tc (°C)

120

160







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