

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (L^2 - π -MOSV)

2SK2507

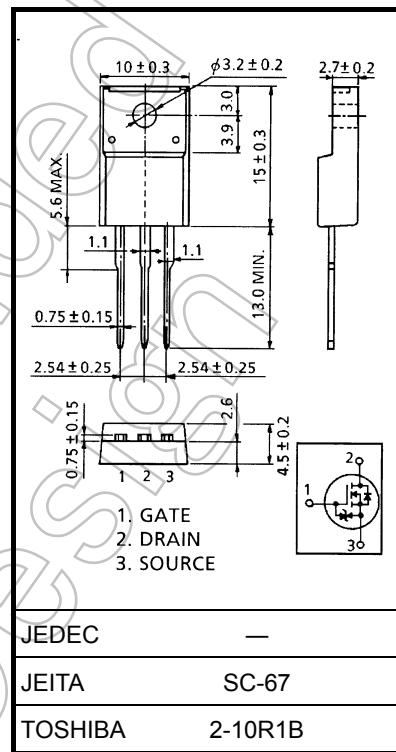
Chopper Regulator, DC-DC Converter and Motor Drive Applications

Unit: mm

- 4-V gate drive
- Low drain-source ON resistance : $R_{DS\ (ON)} = 0.034\ \Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 16\ S$ (typ.)
- Low leakage current : $I_{DSS} = 100\ \mu A$ (max) ($V_{DS} = 50\ V$)
- Enhancement mode : $V_{th} = 0.8$ to $2.0\ V$ ($V_{DS} = 10\ V$, $I_D = 1\ mA$)

Absolute Maximum Ratings ($T_a = 25^\circ C$)

Characteristics	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	50	V
Drain-gate voltage ($R_{GS} = 20\ k\Omega$)	V_{DGR}	50	V
Gate-source voltage	V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	A
	Pulse (Note 1)	I_{DP}	
Drain power dissipation ($T_c = 25^\circ C$)	P_D	30	W
Single pulse avalanche energy (Note 2)	E_{AS}	138	mJ
Avalanche current	I_{AR}	25	A
Repetitive avalanche energy (Note 3)	E_{AR}	3	mJ
Channel temperature	T_{ch}	150	$^\circ C$
Storage temperature range	T_{stg}	-55 to 150	$^\circ C$



Weight: 1.9 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

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th\ (ch-c)}$	4.17	$^\circ C / W$
Thermal resistance, channel to ambient	$R_{th\ (ch-a)}$	62.5	$^\circ C / W$

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

Note 2: $V_{DD} = 25\ V$, $T_{ch} = 25^\circ C$ (initial), $L = 272\ \mu H$, $R_G = 25\ \Omega$, $I_{AR} = 25\ A$

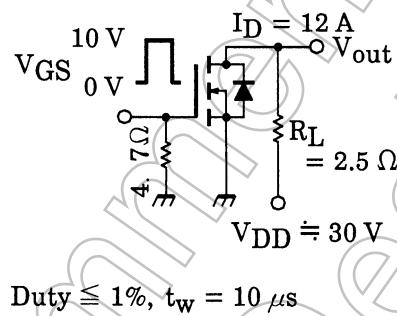
Note 3: Repetitive rating: pulse width limited by maximum channel temperature

This transistor is an electrostatic-sensitive device.

Please handle with caution.

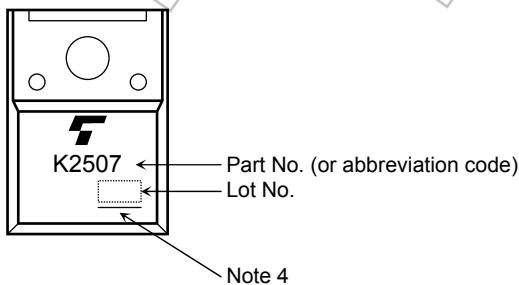
Electrical Characteristics ($T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I_{GSS}	$V_{GS} = \pm 16\text{ V}$, $V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cut-off current	I_{DSS}	$V_{DS} = 50\text{ V}$, $V_{GS} = 0\text{ V}$	—	—	100	μA
Drain-source breakdown voltage	$V_{(\text{BR})\text{DSS}}$	$I_D = 10\text{ mA}$, $V_{GS} = 0\text{ V}$	50	—	—	V
Gate threshold voltage	V_{th}	$V_{DS} = 10\text{ V}$, $I_D = 1\text{ mA}$	0.8	—	2.0	V
Drain-source ON resistance	$R_{DS\text{ (ON)}}$	$V_{GS} = 4\text{ V}$, $I_D = 6\text{ A}$ $V_{GS} = 10\text{ V}$, $I_D = 12\text{ A}$	— —	0.058 0.034	0.08 0.046	Ω
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 10\text{ V}$, $I_D = 12\text{ A}$	8.0	16	—	S
Input capacitance	C_{iss}	$V_{DS} = 10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$	—	900	—	pF
Reverse transfer capacitance	C_{rss}		—	130	—	
Output capacitance	C_{oss}		—	370	—	
Switching time	Rise time	t_r	—	15	—	ns
	Turn-on time	t_{on}	—	25	—	
	Fall time	t_f	—	30	—	
	Turn-off time	t_{off}	—	110	—	
Total gate charge (Gate-source plus gate-drain)	Q_g	$V_{DD} \approx 40\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 25\text{ A}$	—	25	—	nC
Gate-source charge	Q_{gs}		—	19	—	
Gate-drain ("miller") charge	Q_{gd}		—	6	—	

Source-Drain Ratings and Characteristics ($T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	25	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	75	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 25\text{ A}$, $V_{GS} = 0\text{ V}$	—	—	-1.6	V
Reverse recovery time	t_{rr}	$I_{DR} = 25\text{ A}$, $V_{GS} = 0\text{ V}$, $dI_{DR} / dt = 50\text{ A} / \mu\text{s}$	—	60	—	ns
Reverse recovery charge	Q_{rr}		—	45	—	μC

Marking

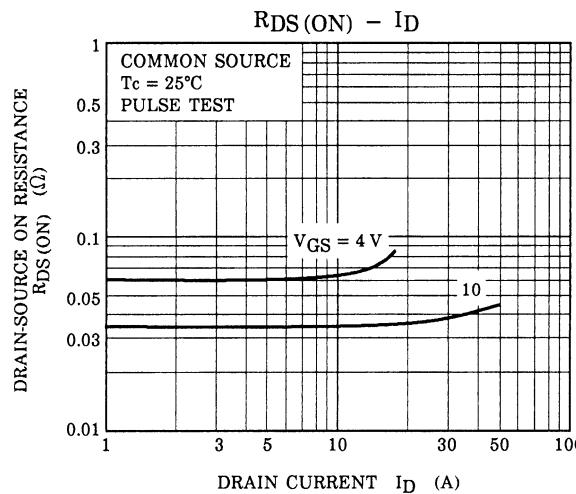
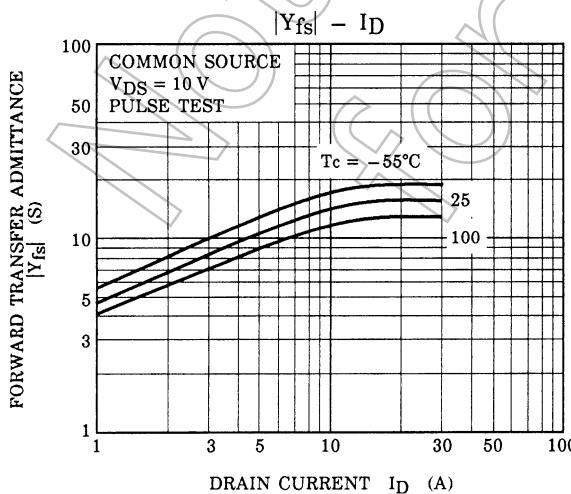
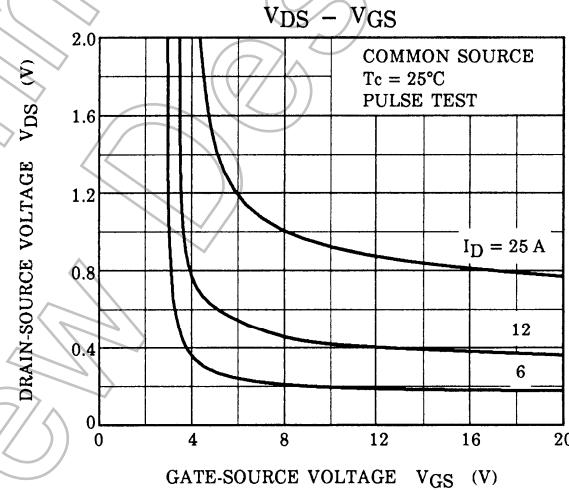
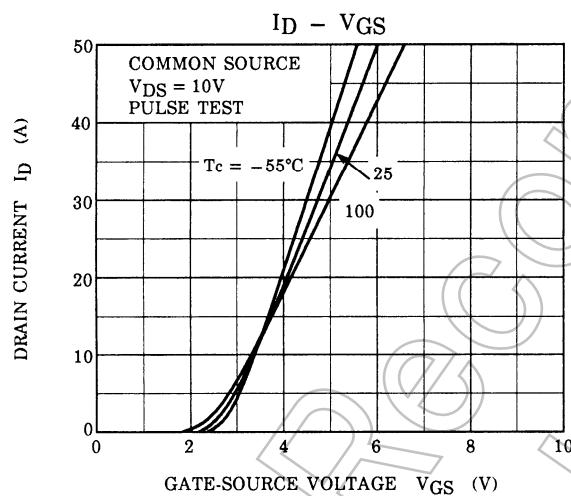
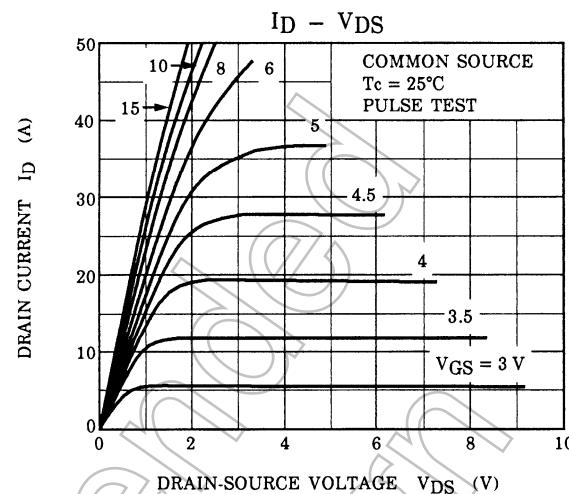
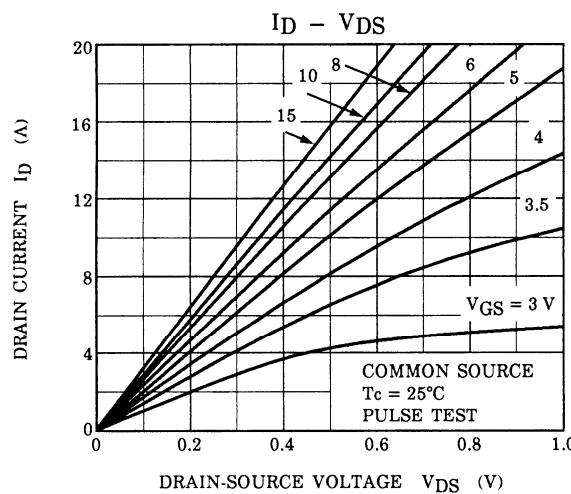


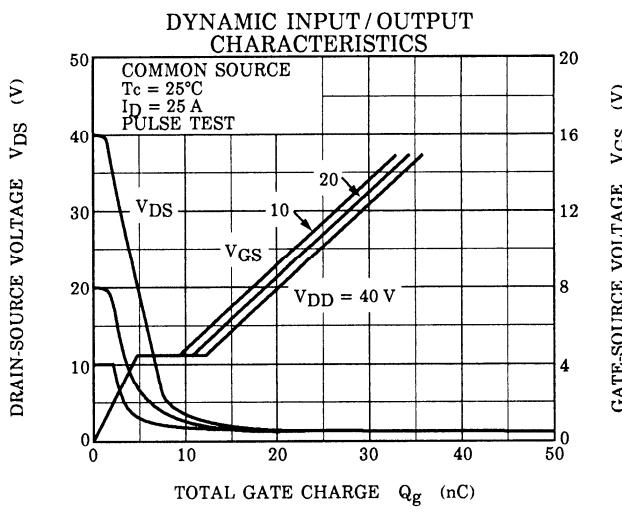
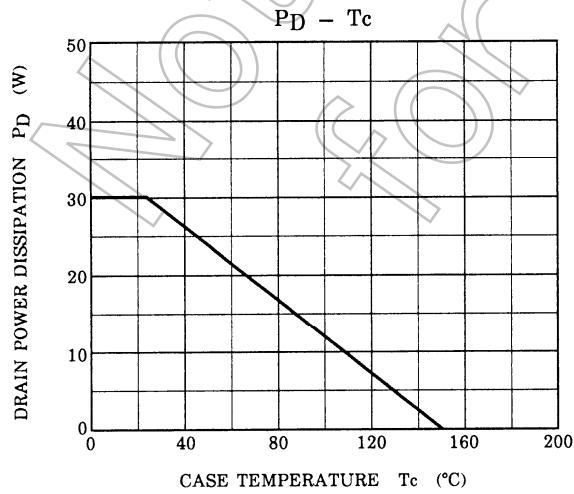
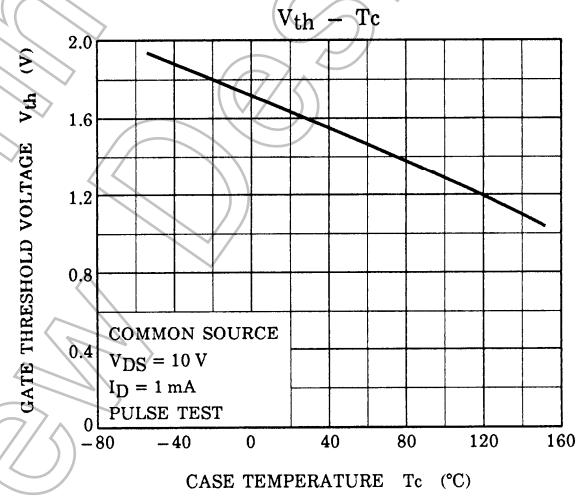
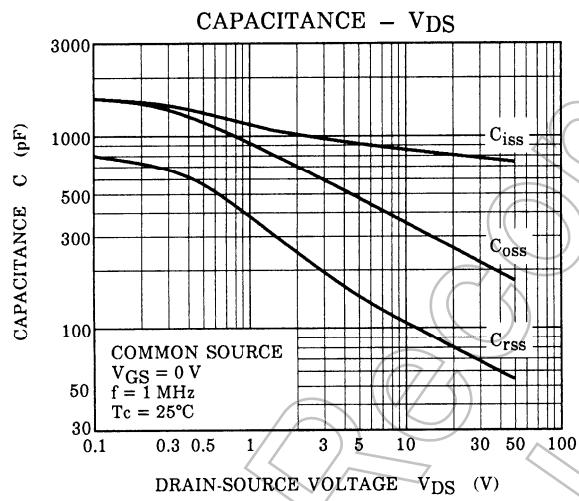
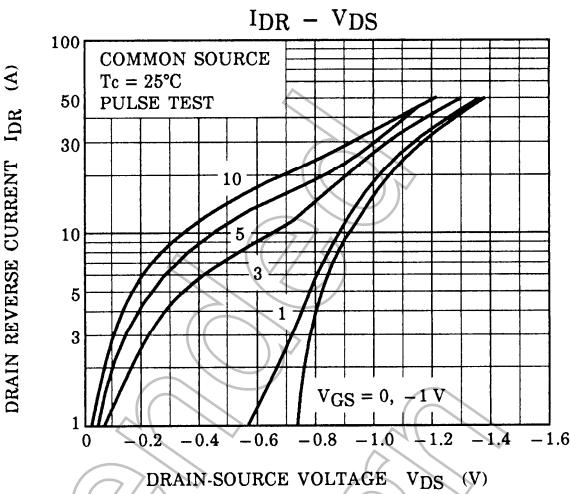
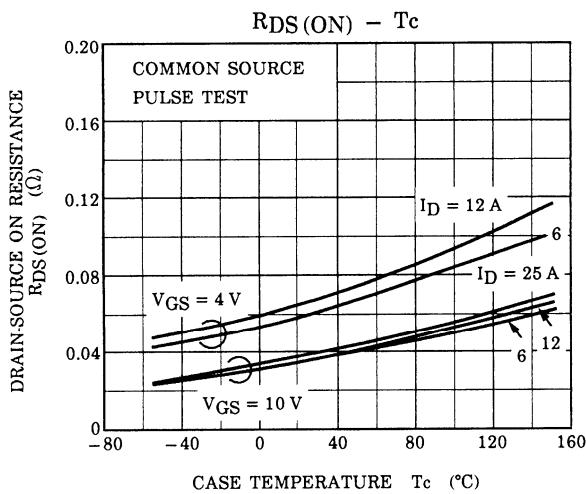
Note 4: A line under a Lot No. identifies the indication of product Labels.

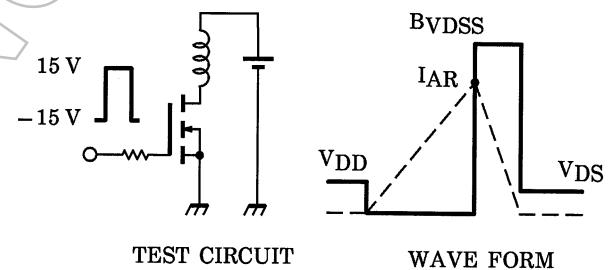
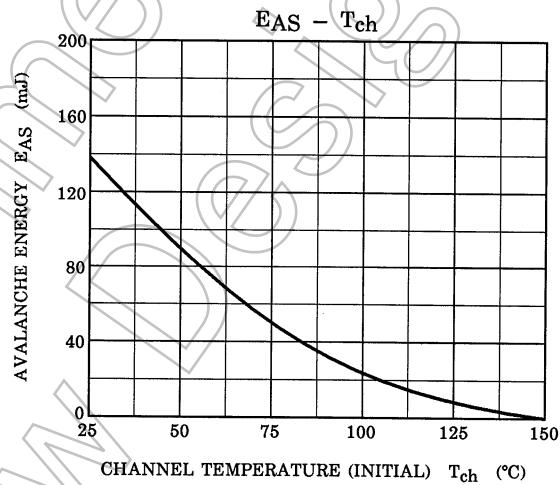
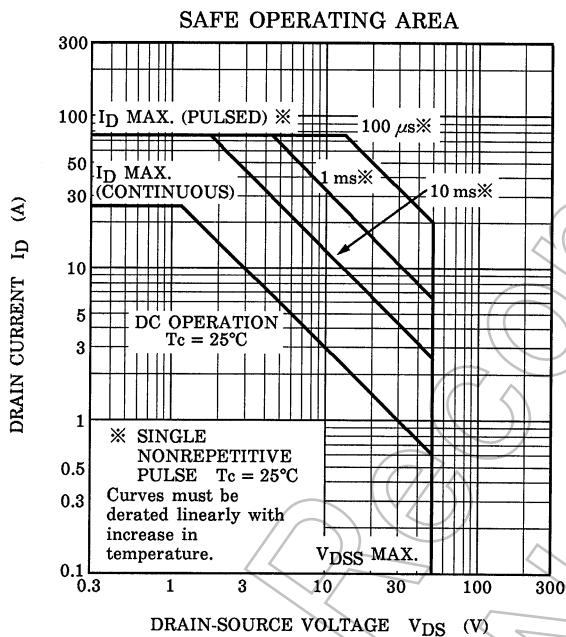
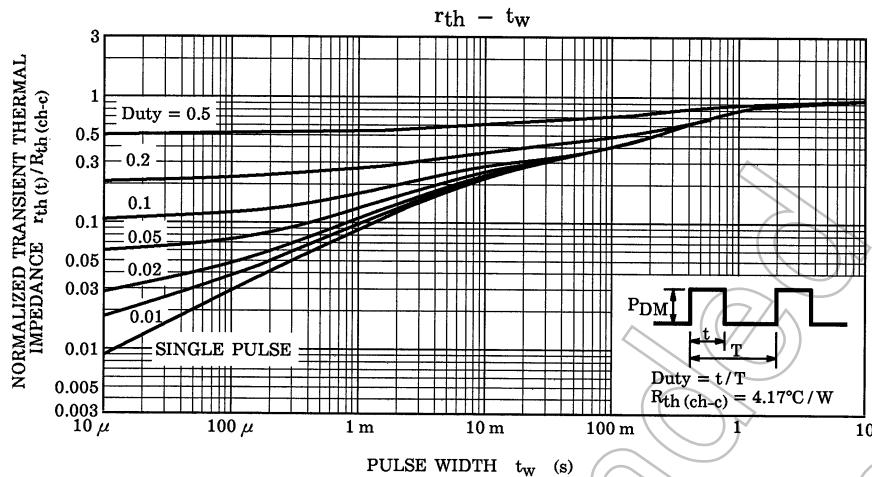
Not underlined: [[Pb]]/INCLUDES > MCV

Underlined: [[G]]/RoHS COMPATIBLE or [G]/RoHS [[Pb]]

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$$R_G = 25 \Omega$$

$$V_{DD} = 25 \text{ V}, L = 272 \mu\text{H}$$

$$E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{BVDSS}{BVDSS - V_{DD}} \right)$$

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