

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (π -MOSV)

2SK3313

HIGH SPEED, HIGH VOLTAGE SWITCHING APPLICATIONS
 SWITCHING REGULATOR, DC-DC CONVERTER APPLICATIONS
 MOTOR DRIVE APPLICATIONS

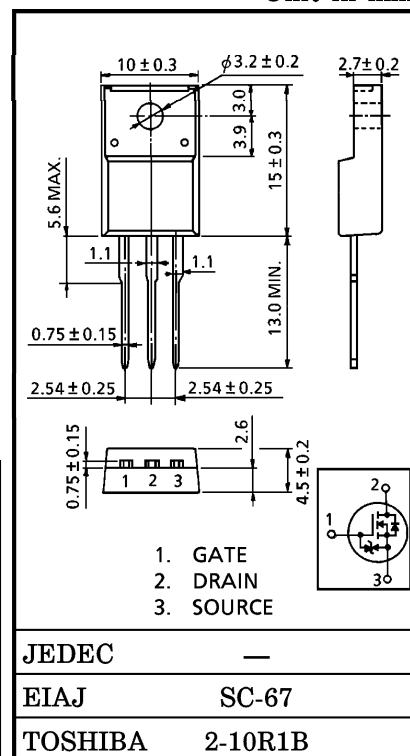
INDUSTRIAL APPLICATIONS

Unit in mm

- Fast Reverse Recovery Time : $t_{rr} = 90 \text{ ns (Typ.)}$
- Built-in High-Speed Free-Wheeling Diode
- Low Drain-Source ON Resistance : $R_{DS(ON)} = 0.5 \Omega \text{ (Typ.)}$
- High Forward Transfer Admittance : $|Y_{fs}| = 8.5 \text{ S (Typ.)}$
- Low Leakage Current : $I_{DSS} = 100 \mu\text{A (Max.) (}V_{DS} = 500 \text{ V)}$
- Enhancement-Mode : $V_{th} = 2.0 \sim 4.0 \text{ V}$
 $(V_{DS} = 10 \text{ V, } I_D = 1 \text{ mA})$

MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	500	V
Drain-Gate Voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	500	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	DC	I_D	12	A
	Pulse	I_{DP}	48	A
Drain Power Dissipation ($T_c = 25^\circ\text{C}$)		P_D	40	W
Single Pulse Avalanche Energy**		E_{AS}	324	mJ
Avalanche Current		I_{AR}	12	A
Repetitive Avalanche Energy*		E_{AR}	4.0	mJ
Channel Temperature		T_{ch}	150	$^\circ\text{C}$
Storage Temperature Range		T_{stg}	$-55 \sim 150$	$^\circ\text{C}$



THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Case	$R_{th(ch-c)}$	3.125	$^\circ\text{C/W}$
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	62.5	$^\circ\text{C/W}$

Note ;

- * Repetitive rating ; Pulse Width Limited by Max. junction temperature.
- ** $V_{DD} = 90 \text{ V, } T_{ch} = 25^\circ\text{C (initial), } L = 3.83 \text{ mH, } R_G = 25 \Omega, I_{AR} = 12 \text{ A}$

**This transistor is an electrostatic sensitive device.
 Please handle with caution.**

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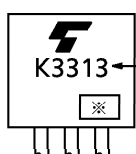
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Gate Leakage Current	I _{GSS}	V _{GS} = ±25 V, V _{DS} = 0 V	—	—	±10	μA	
Gate-Source Breakdown Voltage	V _{(BR)GSS}	I _G = ±100 μA, V _{DS} = 0 V	±30	—	—	V	
Drain Cut-off Current	I _{DSS}	V _{DS} = 500 V, V _{GS} = 0 V	—	—	100	μA	
Drain-Source Breakdown Voltage	V _{(BR)DSS}	I _D = 10 mA, V _{GS} = 0 V	500	—	—	V	
Gate Threshold Voltage	V _{th}	V _{DS} = 10 V, I _D = 1 mA	2.0	—	4.0	V	
Drain-Source ON Resistance	R _{DS(ON)}	V _{GS} = 10 V, I _D = 6 A	—	0.5	0.62	Ω	
Forward Transfer Admittance	Y _{fs}	V _{GS} = 10 V, I _D = 6 A	3.0	8.5	—	S	
Input Capacitance	C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	—	2040	—	pF	
Reverse Transfer Capacitance	C _{rss}		—	210	—		
Output Capacitance	C _{oss}		—	630	—		
Switching Time	Rise Time	t _r		—	22	—	ns
	Turn-on Time	t _{on}		—	58	—	
	Fall Time	t _f		—	36	—	
	Turn-off Time	t _{off}		—	180	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q _g	V _{DD} ≐ 400 V, V _{GS} = 10 V, I _D = 12 A	—	45	—	nC	
Gate-Source Charge	Q _{gs}		—	25	—		
Gate-Drain ("Miller") Charge	Q _{gd}		—	20	—		

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I _{DR}	—	—	—	12	A
Pulse Drain Reverse Current	I _{DRP}	—	—	—	48	A
Diode Forward Voltage	V _{DSF}	I _{DR} = 12 A, V _{GS} = 0 V	—	—	-1.7	V
Reverse Recovery Time	t _{rr}	I _{DR} = 12 A, V _{GS} = 0 V dI _{DR} /dt = 100 A/μs	—	90	160	ns
Reverse Recovery Charge	Q _{rr}		—	0.25	—	μC

MARKING



TYPE

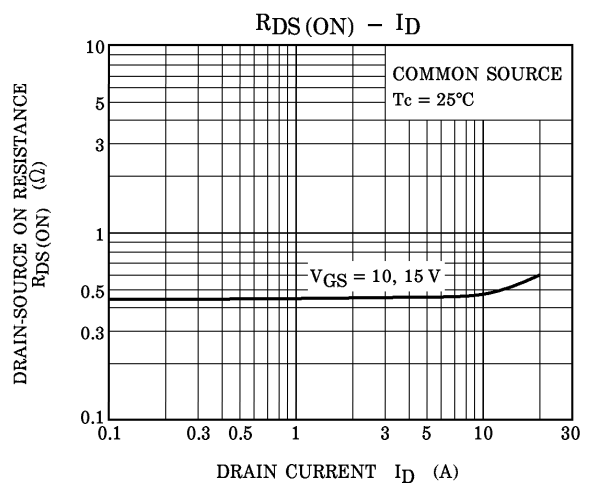
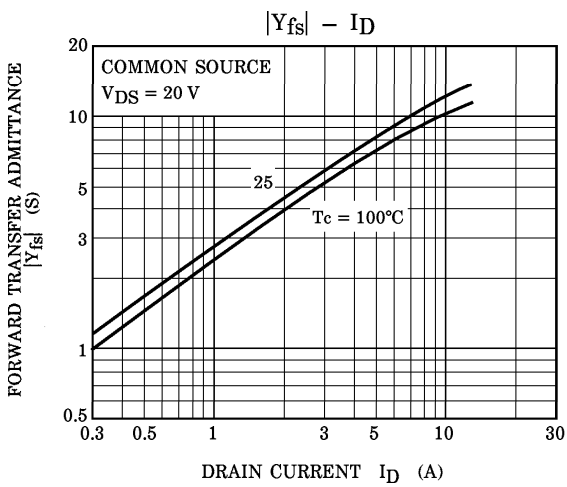
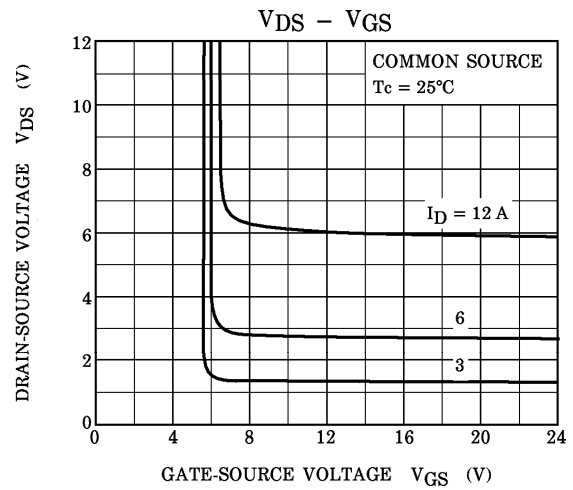
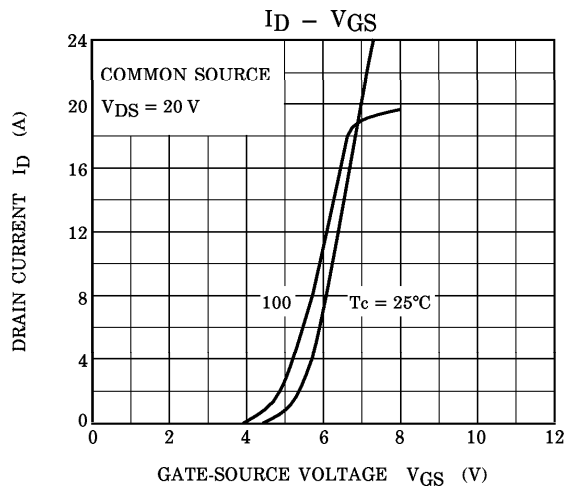
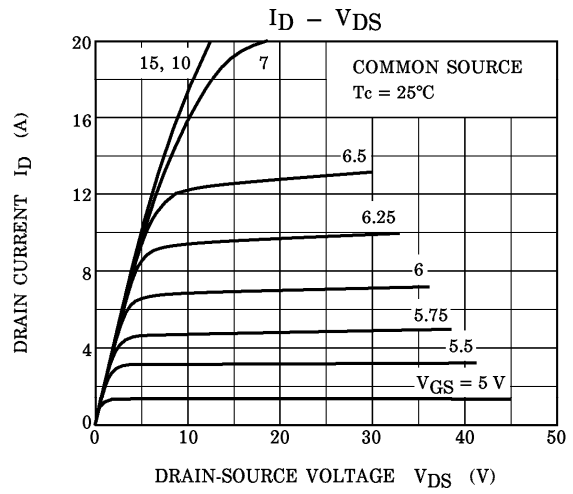
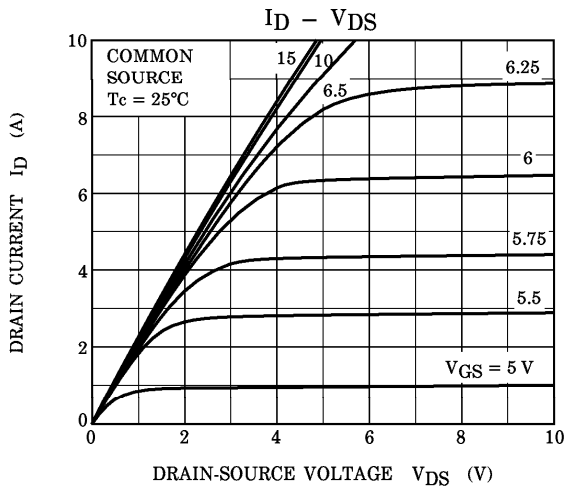
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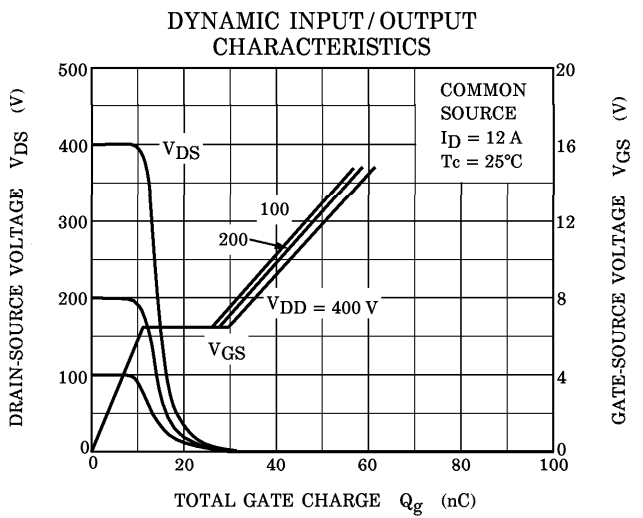
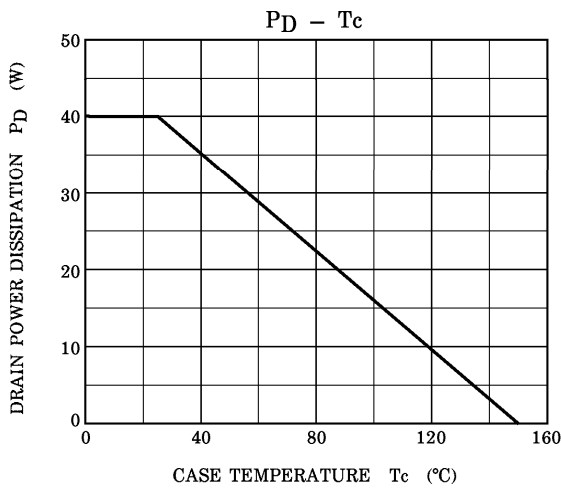
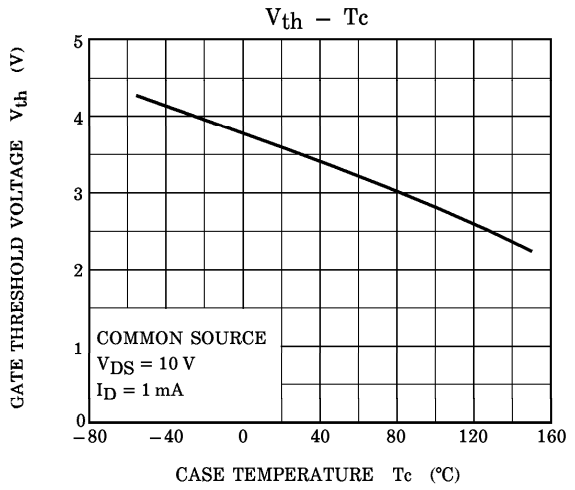
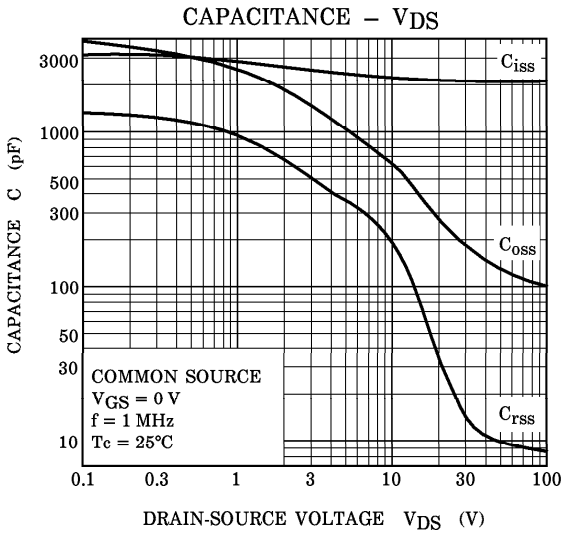
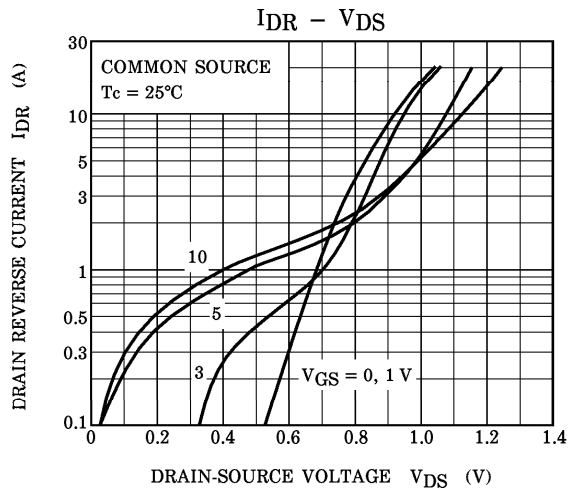
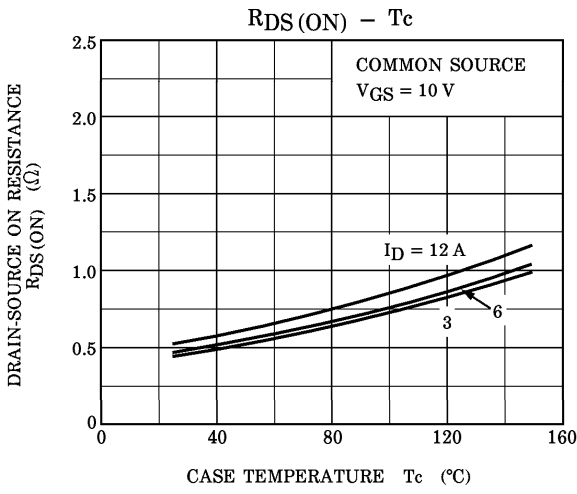


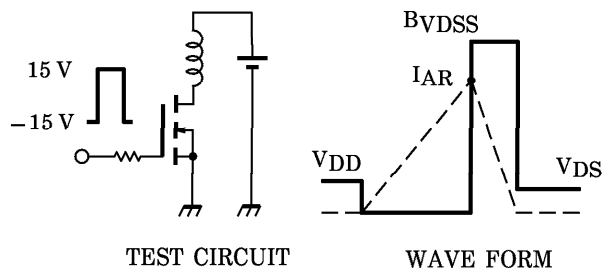
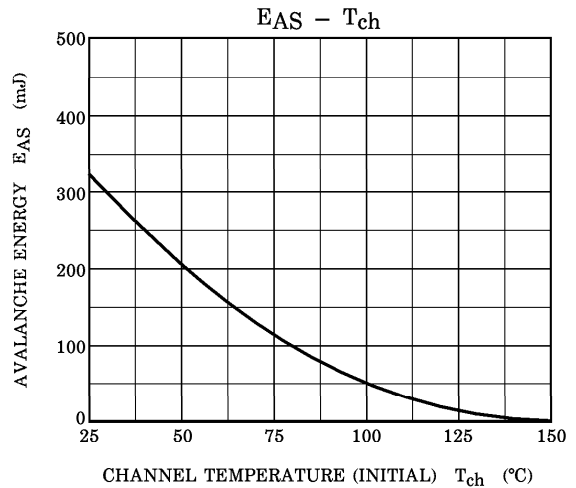
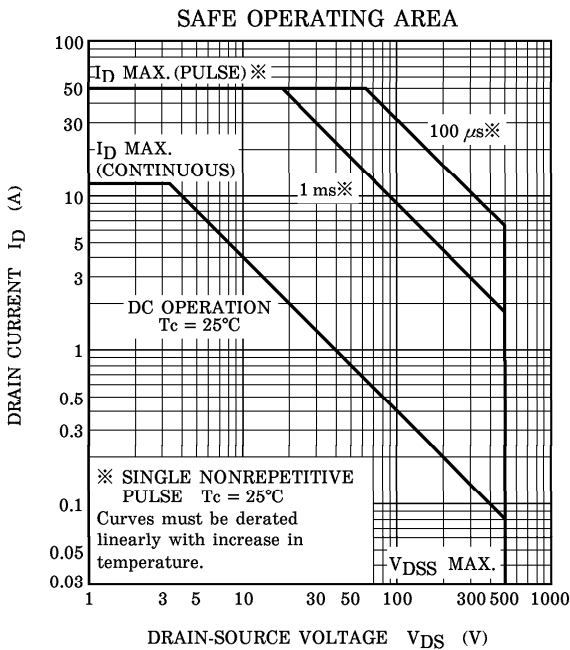
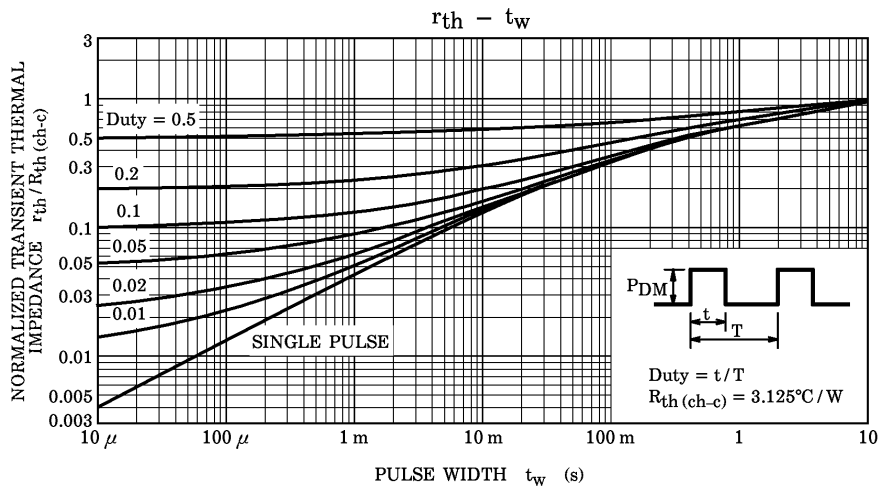
Month (Starting from Alphabet A)



Year (Last Number of the Christian Era)







Peak $I_{AR} = 12 \text{ A}$, $R_G = 25 \Omega$, $V_{DD} = 90 \text{ V}$, $L = 3.83 \text{ mH}$

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