

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (L²-π-MOSVI)

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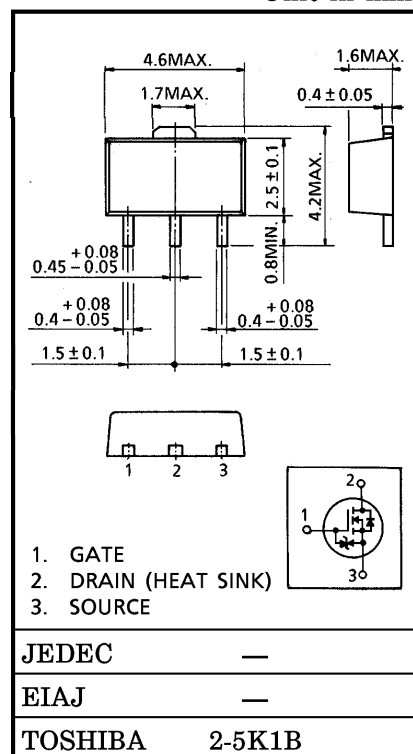
HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS
 CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

INDUSTRIAL APPLICATIONS
 Unit in mm

- 4 V Gate Drive
- Low Drain-Source ON Resistance : $R_{DS(ON)} = 0.13 \Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 2.5 S$ (Typ.)
- Low Leakage Current : $I_{DSS} = 100 \mu A$ (Max.) ($V_{DS} = 30 V$)
- Enhancement-Mode : $V_{th} = 0.8 \sim 2.0 V$
 ($V_{DS} = 10 V, I_D = 1 mA$)

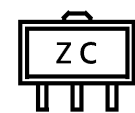
MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	30	V
Drain-Gate Voltage ($R_{GS} = 20k\Omega$)		V_{DGR}	30	V
Gate-Source Voltage		V_{GSS}	± 20	V
Drain Current	DC	I_D	2	A
	Pulse	I_{DP}	6	A
Drain Power Dissipation (Ta = 25°C)		P_D	0.5	W
Drain Power Dissipation***		P_D	1.5	W
Single Pulse Avalanche Energy**		E_{AS}	56	mJ
Avalanche Current		I_{AR}	2	A
Repetitive Avalanche Energy*		E_{AR}	0.05	mJ
Channel Temperature		T_{ch}	150	°C
Storage Temperature Range		T_{stg}	-55~150	°C



Weight : 0.05 g (Typ.)

MARKING



THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	250	°C/W

Note ;

- * Repetitive rating ; Pulse Width Limited by Max. junction temperature.
- ** $V_{DD} = 25 V, T_{ch} = 25^\circ C$ (initial), $L = 10 mH, R_G = 25 \Omega, I_{AR} = 2 A$
- *** Mounted on ceramic substrate (1 inch² × 0.8 t)

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

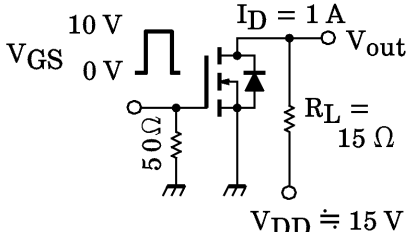
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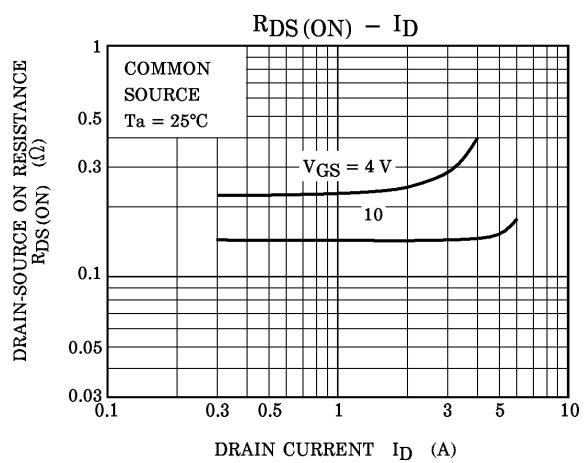
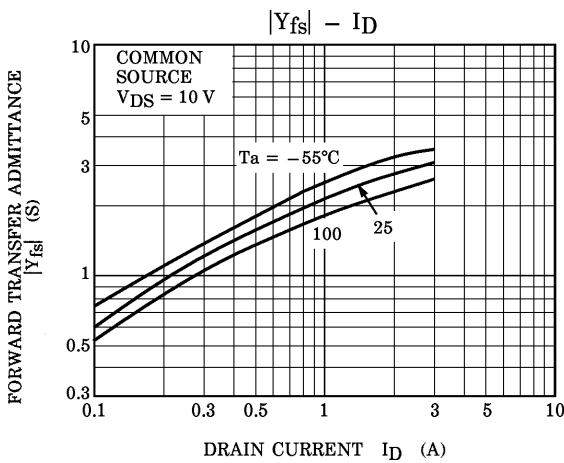
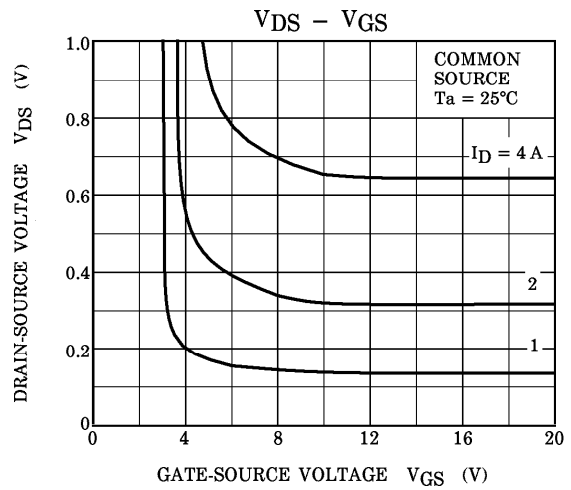
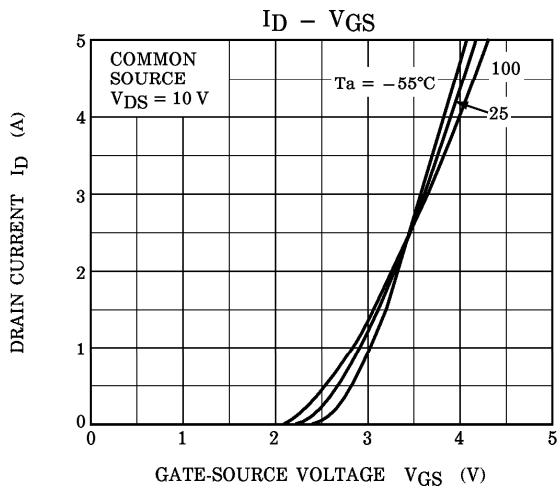
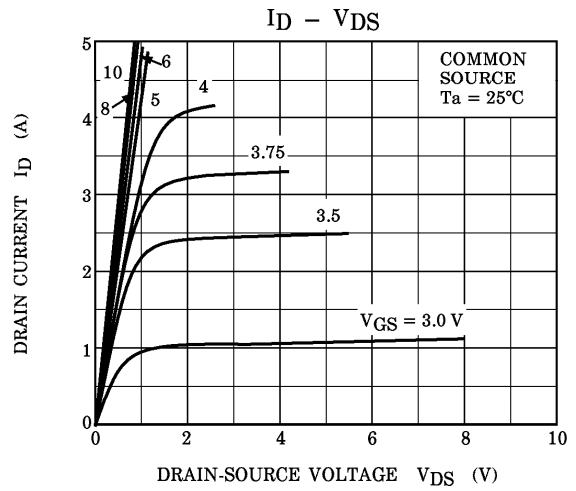
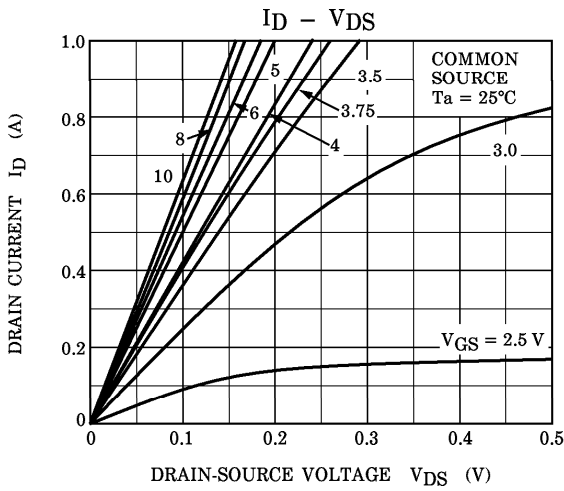
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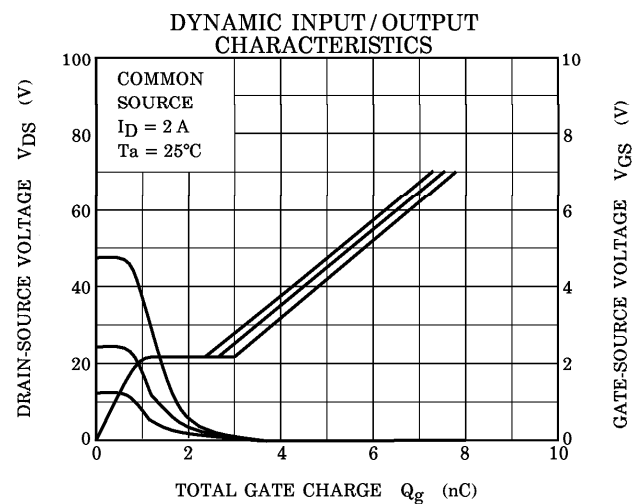
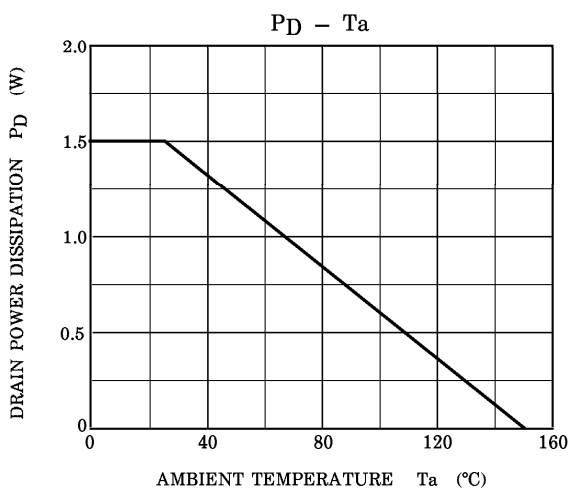
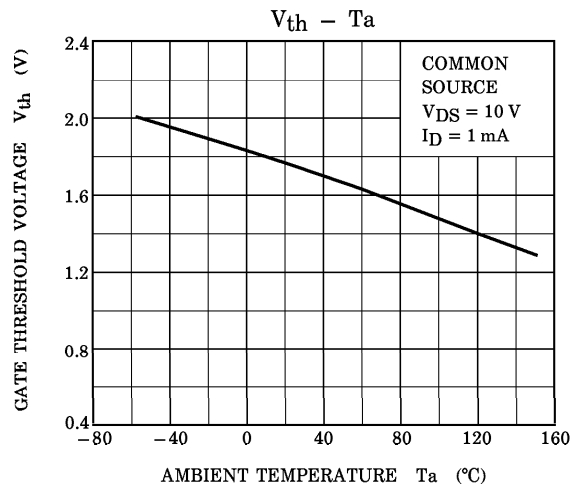
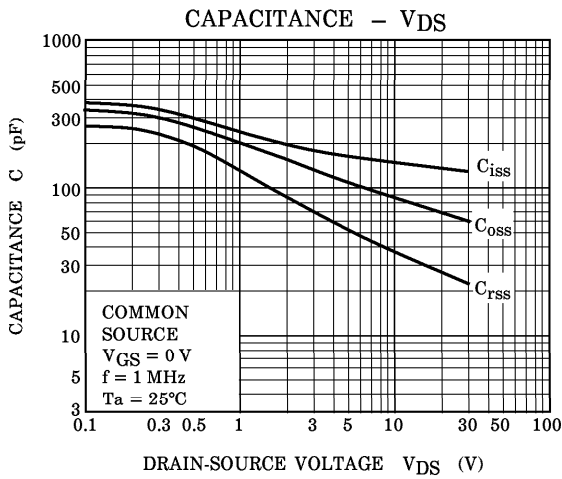
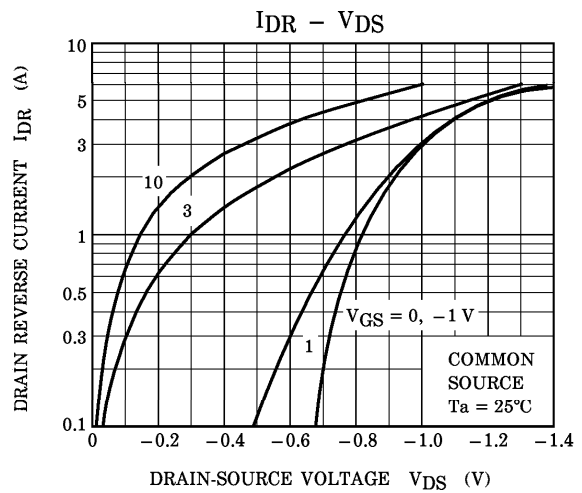
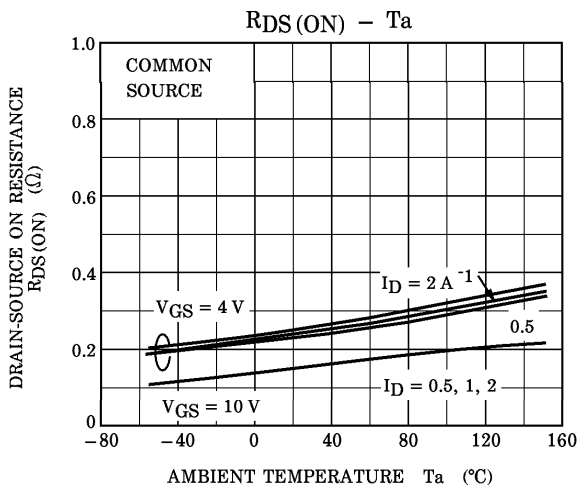
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

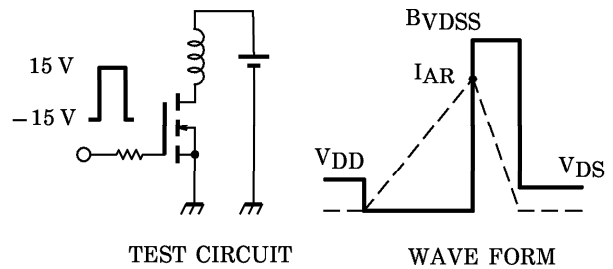
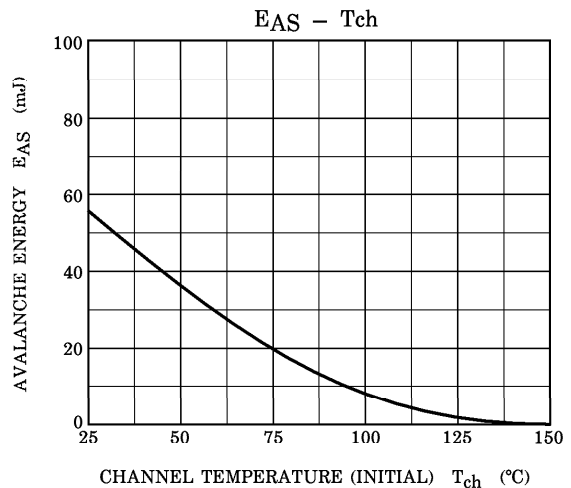
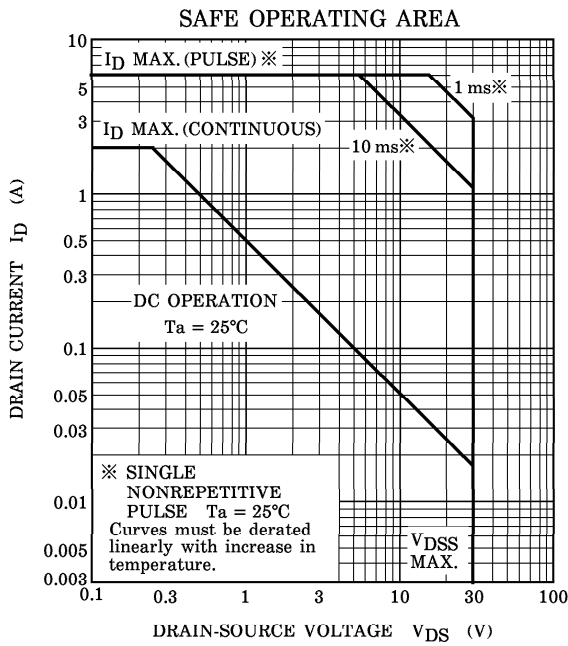
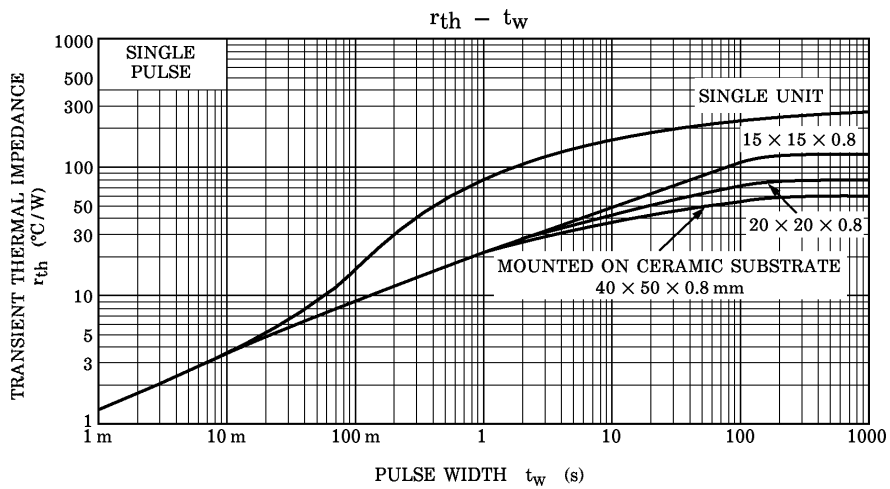
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Gate Leakage Current	I _{GSS}	V _{GS} = ±16 V, V _{DS} = 0 V	—	—	±10	μA	
Drain Cut-off Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V	—	—	100	μA	
Drain-Source Breakdown Voltage	V _{(BR) DSS}	I _D = 10 mA, V _{GS} = 0 V	30	—	—	V	
Gate Threshold Voltage	V _{th}	V _{DS} = 10 V, I _D = 1 mA	0.8	—	2.0	V	
Drain-Source ON Resistance	R _{DS (ON)}	V _{GS} = 4 V, I _D = 1 A	—	0.18	0.25	Ω	
		V _{GS} = 10 V, I _D = 1 A	—	0.13	0.18		
Forward Transfer Admittance	Y _{fs}	V _{DS} = 10 V, I _D = 1 A	1.2	2.5	—	S	
Input Capacitance	C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	—	140	—	pF	
Reverse Transfer Capacitance	C _{rss}		—	30	—		
Output Capacitance	C _{oss}		—	80	—		
Switching Time	Rise Time	t _r		—	10	—	ns
	Turn-on Time	t _{on}		—	15	—	
	Fall Time	t _f		—	85	—	
	Turn-off Time	t _{off}		V _{IN} : t _r , t _f < 5 ns, Duty ≤ 1%, t _w = 10 μs	—	195	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q _g	V _{DD} ≐ 24 V, V _{GS} = 10 V, I _D = 2 A	—	5.8	—	nC	
Gate-Source Charge	Q _{gs}		—	4.3	—		
Gate-Drain (“Miller”) Charge	Q _{gd}		—	1.5	—		

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I _{DR}	—	—	—	2	A
Pulse Drain Reverse Current	I _{DRP}	—	—	—	6	A
Diode Forward Voltage	V _{DSF}	I _{DR} = 2 A, V _{GS} = 0 V	—	—	-1.5	V
Reverse Recovery Time	t _{rr}	I _{DR} = 2 A, V _{GS} = 0 V	—	50	—	ns
Reverse Recovery Charge	Q _{rr}	dI _{DR} / dt = 50 A / μs	—	20	—	nC







Peak $I_{AR} = 2 \text{ A}$, $R_G = 25 \Omega$, $V_{DD} = 25 \text{ V}$, $L = 10 \text{ mH}$

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