

TOSHIBA POWER MOS FET MODULE SILICON N CHANNEL MOS TYPE (L²-π-MOS V 4 IN 1)

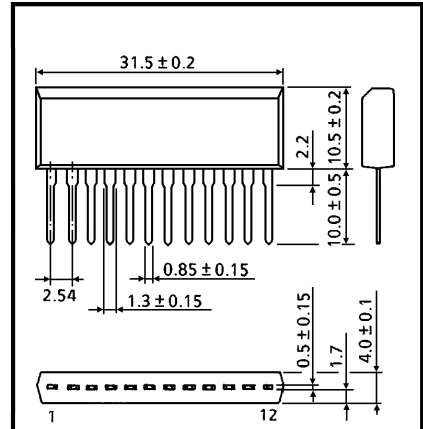
MP4412

HIGH POWER, HIGH SPEED SWITCHING APPLICATIONS.
FOR PRINTER HEAD PIN DRIVER AND PULSE MOTOR DRIVER
FOR SOLENOID DRIVER

INDUSTRIAL APPLICATIONS

Unit in mm

- 4 V Gate Drive Available
- Small Package by Full Molding (SIP 12 Pin)
- High Drain Power Dissipation (4 Devices Operation)
: P_T = 28 W (T_c = 25°C)
- Low Drain-Source ON Resistance : R_{DS(ON)} = 0.17 Ω
- High Forward Transfer Admittance : |Y_{fs}| = 4.5 S (typ.)
- Low Leakage Current : I_{GSS} = ±10 μA (max.) (V_{GS} = ±16 V)
I_{DSS} = 100 μA (max.) (V_{DS} = 100 V)
- Enhancement-Mode : V_{th} = 0.8~2.0 V
(V_{DS} = 10 V, I_D = 1 mA)

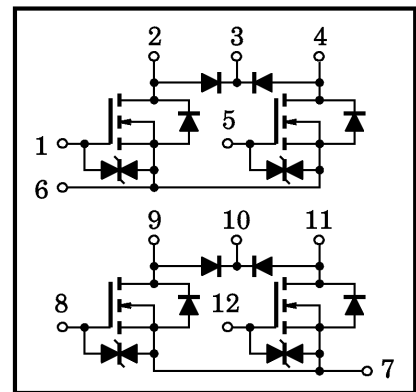


MOS FET	DIODE
1, 5, 8, 12 GATE	2, 4, 9, 11 ANODE
2, 4, 9, 11 DRAIN	3, 10 CATHODE
6, 7 SOURCE	

JEDEC	—
EIAJ	—
TOSHIBA	2-32C1D

Weight : 3.9 g (typ.)

CONFIGURATION



MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V _{DSS}	100	V
Drain-Gate Voltage (R _{GS} = 20 kΩ)		V _{DGR}	100	V
Gate-Source Voltage		V _{GSS}	±20	V
Drain Current	DC	I _D	5	A
	Pulse	I _{DP}	20	
Drain Power Dissipation (1 Device Operation, Ta = 25°C)		P _D	2.2	W
Drain Power Dissipation (4 Devices Operation)	Ta = 25°C	P _{DT}	4.4	W
	Tc = 25°C		28	
Single Pulse Avalanche Energy*		E _{AS}	180	mJ
Avalanche Current		I _{AR}	5	A
Repetitive Avalanche Energy**	1 Device Operation	E _{AR}	0.22	mJ
	4 Devices Operation	E _{ART}	0.44	
Channel Temperature		T _{ch}	150	°C
Storage Temperature Range		T _{stg}	-55~150	°C

Note ;

- * Avalanche energy (single pulse) applied condition
V_{DD} = 25 V, Starting T_{ch} = 25°C, L = 11.6 mH, R_G = 25 Ω, I_{AR} = 5 A
- ** Repetitive rating ; Pulse Width Limited by maximum channel temperature.

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

961001EAA2

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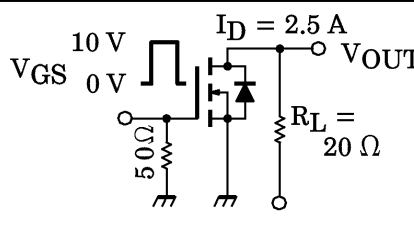
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THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance of Channel to Ambient (4 Devices Operation, Ta = 25°C)	$\Sigma R_{th(ch-a)}$	28.4	°C/W
Thermal Resistance of Channel to Case (4 Devices Operation, Tc = 25°C)	$\Sigma R_{th(ch-c)}$	4.46	°C/W
Maximum Lead Temperature for Soldering Purposes (3.2 mm from Case for t = 10 s)	T _L	260	°C

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} = 100 V, V _{GS} = 0 V	—	—	100	μA	
Drain-Source Breakdown Voltage	V _{(BR)DSS}	I _D = 10 mA, V _{GS} = 0 V	100	—	—	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 = 2.5 A	—	0.22	0.30	Ω	
		V _{GS} = 10 V, I _D = 2.5 A	—	0.17	0.23		
Forward Transfer Admittance	Y _{fs}	V _{DS} = 10 V, I _D = 2.5 A	2.0	4.5	—	S	
Input Capacitance	C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V f = 1 MHz	—	500	—	pF	
Reverse Transfer Capacitance	C _{rss}		—	80	—		
Output Capacitance	C _{oss}		—	190	—		
Switching Time	Rise Time	t _r		—	17	—	ns
	Turn-on Time	t _{on}		—	25	—	
	Fall Time	t _f		—	50	—	
	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} ≐ 80 V, V _{GS} = 10 V I _D = 5 A	—	22	—	nC	
Gate-Source Charge	Q _{gs}		—	15	—		
Gate-Drain (“Miller”) Charge	Q _{gd}		—	7	—		

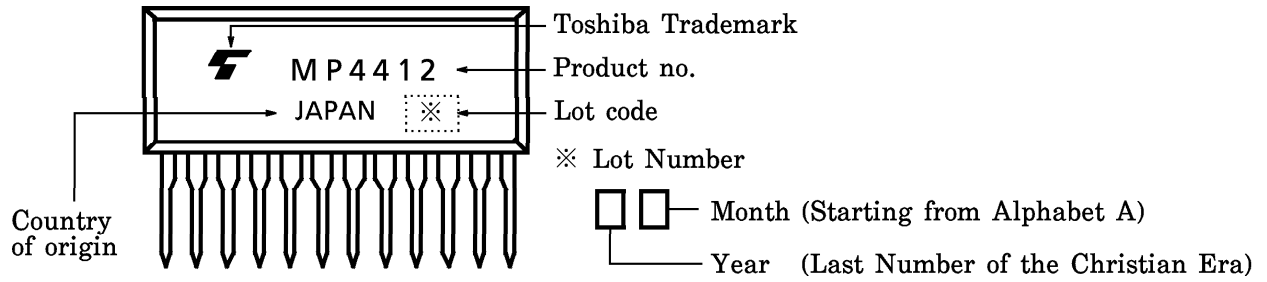
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

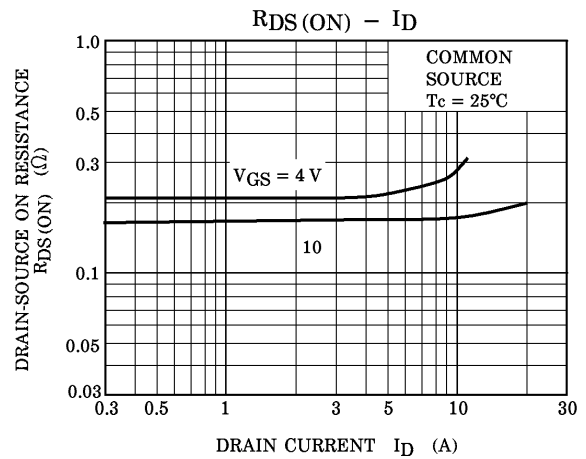
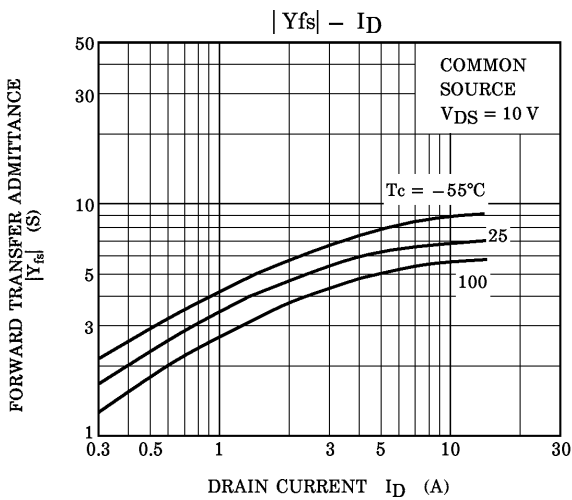
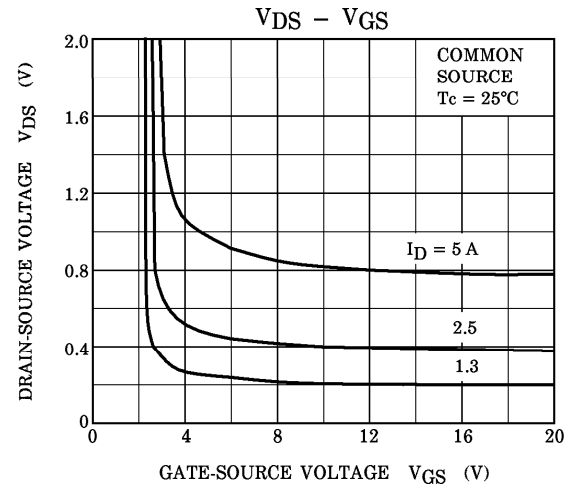
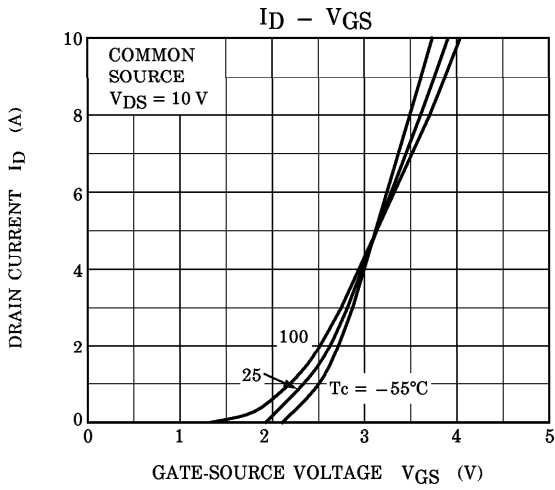
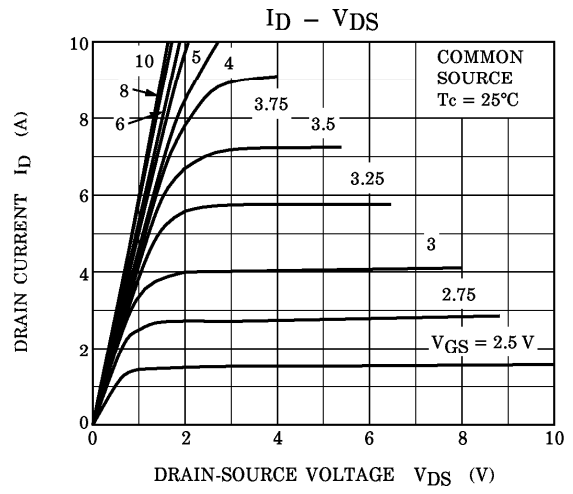
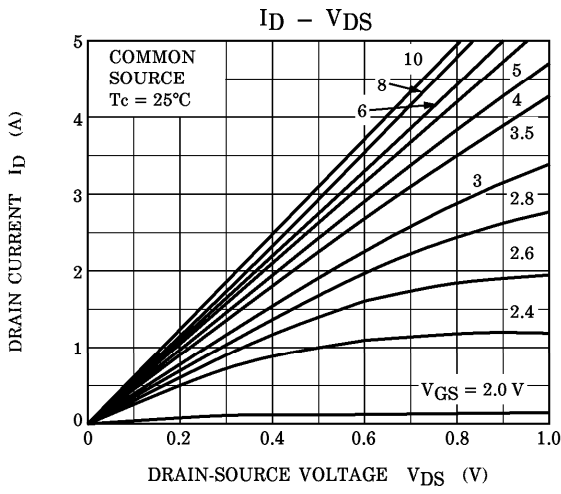
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I _{DR}	—	—	—	5	A
Pulse Drain Reverse Current	I _{DRP}	—	—	—	20	A
Diode Forward Voltage	V _{DSF}	I _{DR} = 5 A, V _{GS} = 0 V	—	—	–1.7	V
Reverse Recovery Time	t _{rr}	I _{DR} = 5 A, V _{GS} = 0 V	—	160	—	ns
Reverse Recovery Charge	Q _{rr}	dI _{DR} / dt = 50 A / μs	—	0.28	—	μC

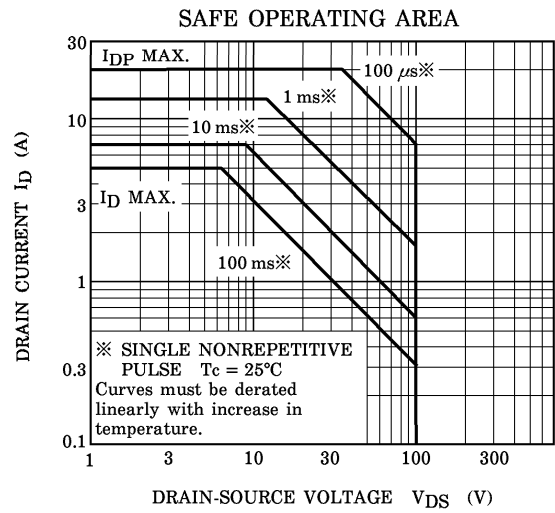
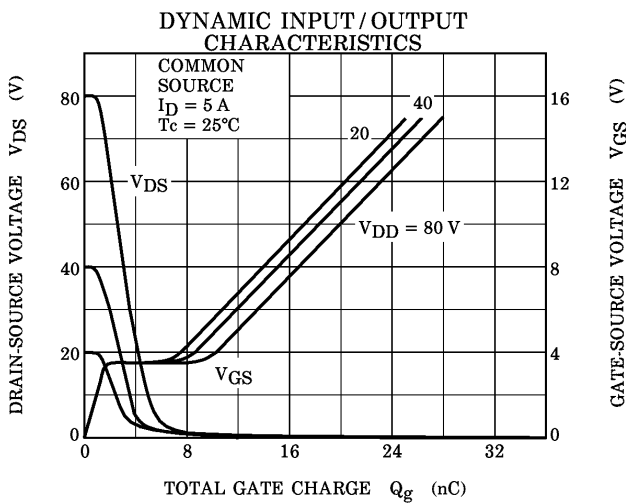
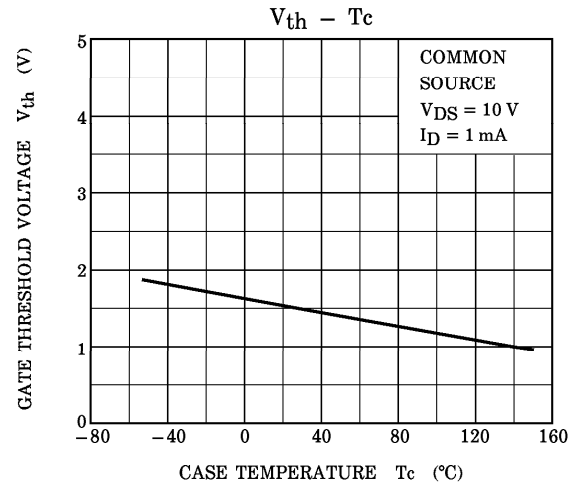
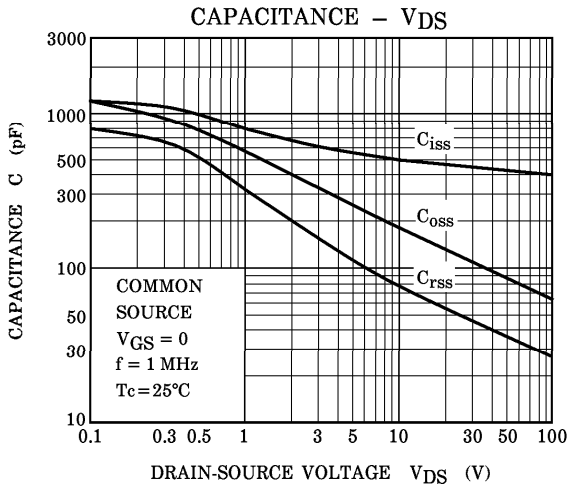
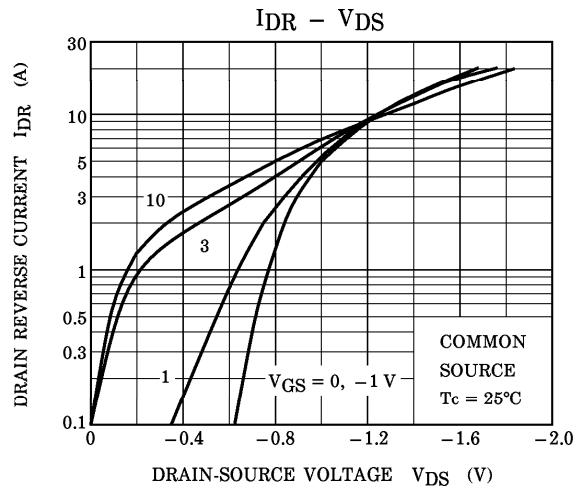
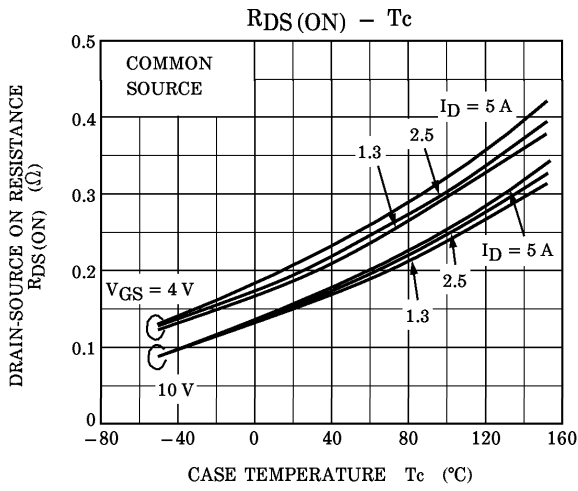
FLYBACK-DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

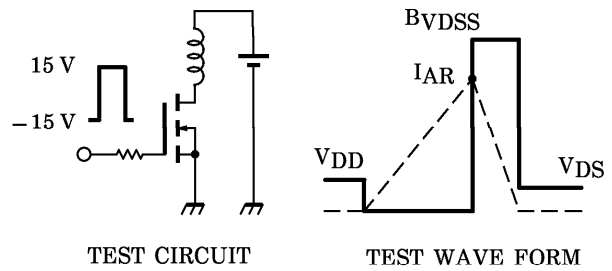
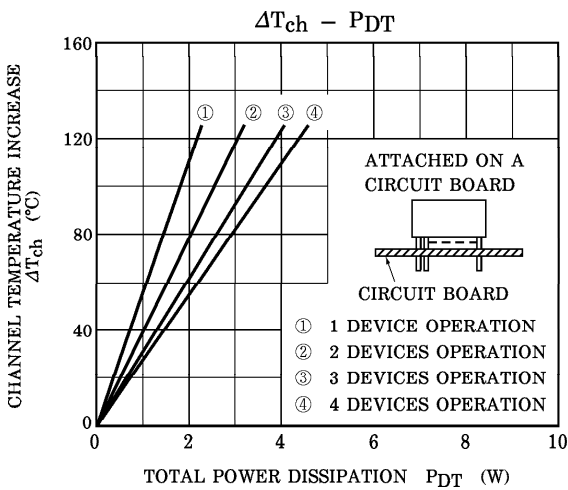
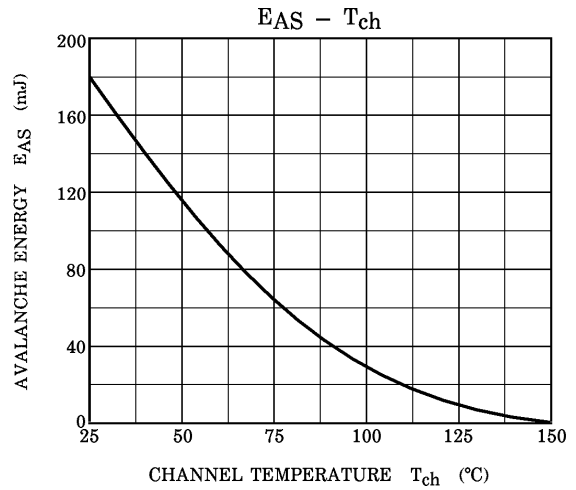
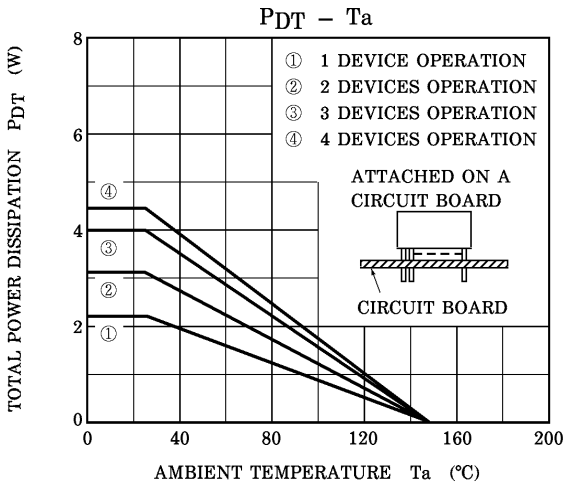
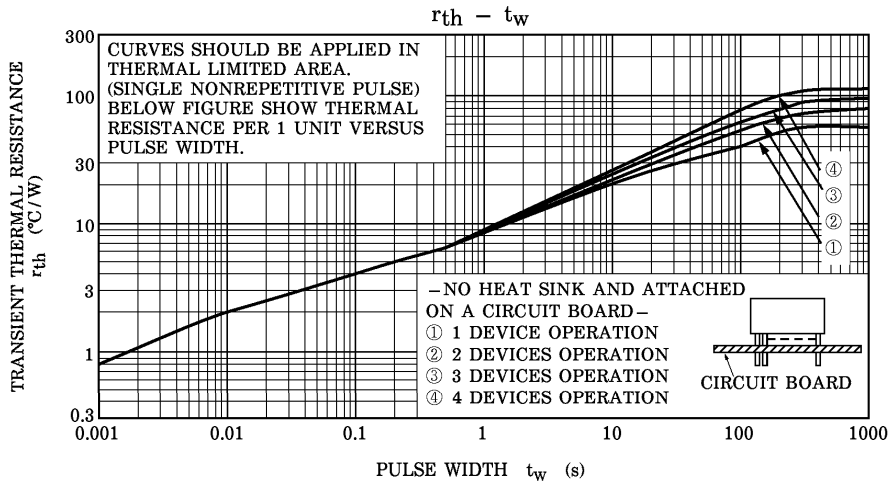
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Forward Current	I_{FM}	—	—	—	5	A
Reverse Current	I_R	$V_R = 100\text{ V}$	—	—	0.4	μA
Reverse Voltage	V_R	$I_R = 100\ \mu\text{A}$	100	—	—	V
Forward Voltage	V_F	$I_F = 2\text{ A}$	—	—	2.3	V

MARKING









Peak $I_{AR} = 5 \text{ A}$, $R_G = 25 \Omega$
 $V_{DD} = 25 \text{ V}$, $L = 11.6 \text{ mH}$

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