

N-Channel Enhancement Mode MOSFET

TDM3744

DESCRIPTION

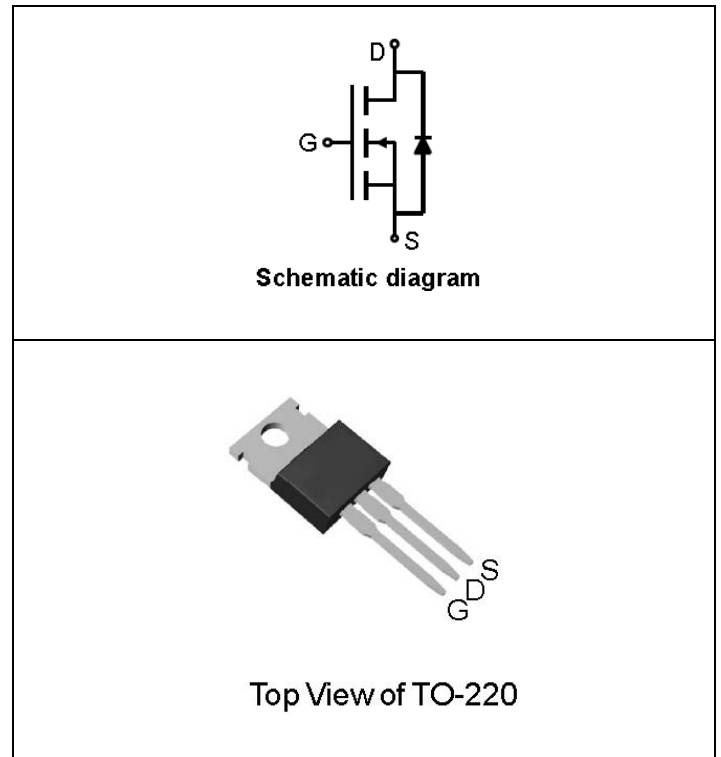
The TDM3744 uses advanced trench technology to provide excellent RDS(ON) and low gate charge. This device is suitable for use as a load switch or in PWM applications.

GENERAL FEATURES

- 80V/196A
RDS(ON) < 3.9mΩ @ VGS=10V
- High Power and current handling capability
- Lead free product is available
- TO220 Package

Application

- Synchronous Rectification in SMPS
- Hard Switching and High Speed Circuit
- Power Tools
- UPS
- Motor Control



ABSOLUTE MAXIMUM RATINGS(T_A=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V _{DS}	80	V
Gate-Source Voltage	V _{GS}	+20	V
Drain Current @ Continuous(Silicon Limited)	I _D (T _C =25°C)	196	A
	I _D (T _C =100°C)	139	A
Drain Current @ Continuous(Package Limited)	I _D (T _C =25°C)	180	A
Drain Current @ Current-Pulsed	I _{DM} (T _C =25°C)	500	A
Maximum Power Dissipation	P _D (T _C =25°C)	272	W
Avalanche Energy, Single Pulse	E _{AS} (L=0.5mH,T _C =25°C)	306	mJ
Operating Junction and Storage Temperature Range	T _J ,T _{STG}	-55 To 175	°C

THERMAL CHARACTERISTICS

Thermal Resistance,Junction-to-Ambient (Note 2)	R _{θJA}	60	°C/W
Thermal Resistance,Junction-to-Case	R _{θJC}	0.55	°C/W

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ELECTRICAL CHARACTERISTICS ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
STATIC CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	80	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=80V, V_{GS}=0V, T_j=25^{\circ}\text{C}$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3	4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$	-	3.2	3.9	$m\Omega$
Transconductance	g_{fs}	$V_{DS}=5V, I_D=20A$	-	70	-	S
Gate Resistance	R_G	$V_{DS}=0V, V_{GS}=0V, F=1.0\text{MHz}$	-	1.3	-	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{iss}	$V_{DS}=40V, V_{GS}=0V, F=1.0\text{MHz}$	-	3635	-	PF
Output Capacitance	C_{oss}		-	1317	-	PF
Reverse Transfer Capacitance	C_{rss}		-	91	-	PF
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=40V, V_{GS}=10V, R_G=10\Omega, I_D=20A$	-	13	-	nS
Turn-on Rise Time	t_r		-	18	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	44	-	nS
Turn-Off Fall Time	t_f		-	25	-	nS
Total Gate Charge	Q_g	$V_{DD}=40V, I_D=20A, V_{GS}=10V$	-	74	-	nC
Gate-Source Charge	Q_{gs}		-	17	-	nC
Gate-Drain Charge	Q_{gd}		-	31	-	nC
REVERSE DIODE CHARACTERISTICS						
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=20A$	-	0.9	1.2	V
Body Diode Reverse Recovery Time	T_{rr}	$I_F=20A, di/dt=400A/\mu s$	-	44	-	nS
Body Diode Reverse Recovery Charge	Q_{rr}		-	155	-	nC

Typical Operating Characteristics

Fig 1. Typical Output Characteristics

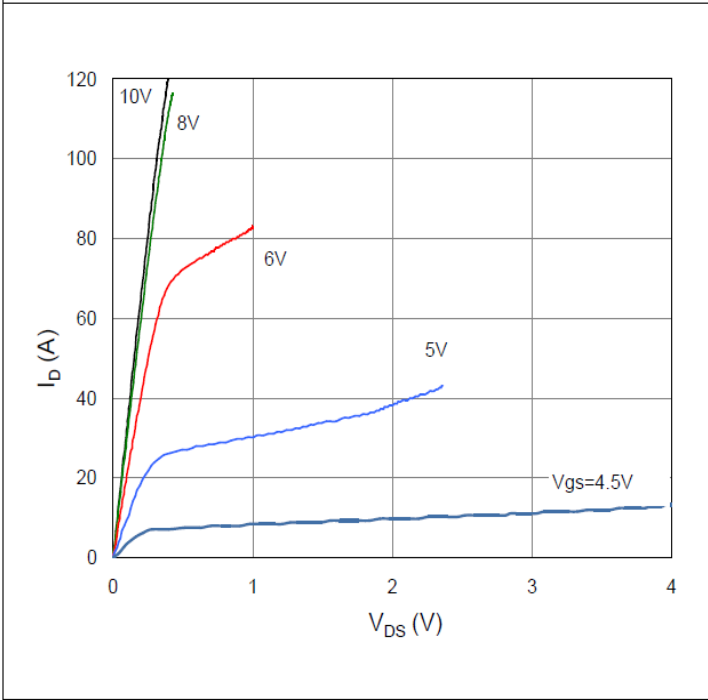


Figure 2. On-Resistance vs. Gate-Source Voltage

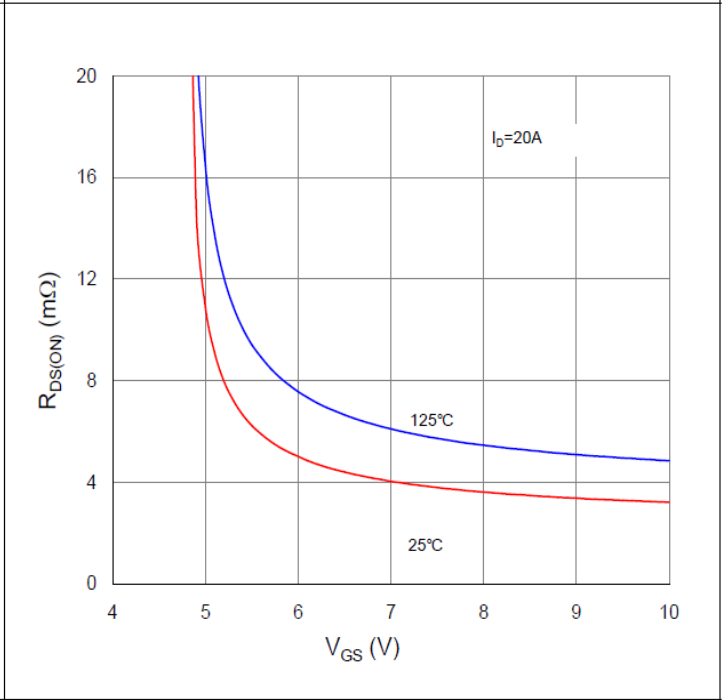


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

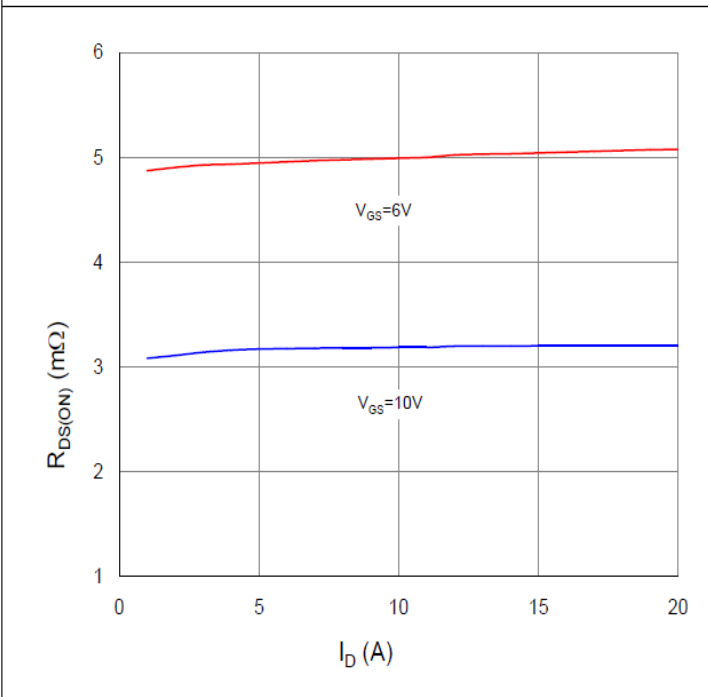
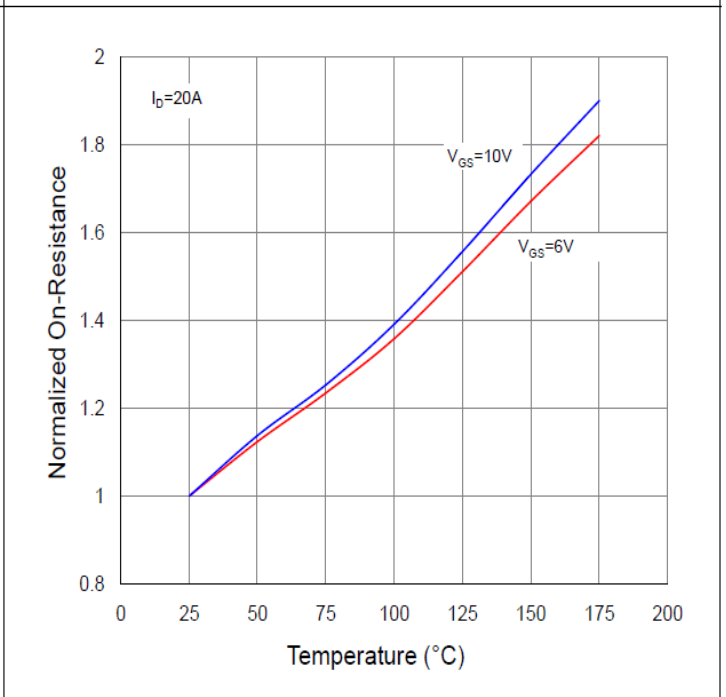
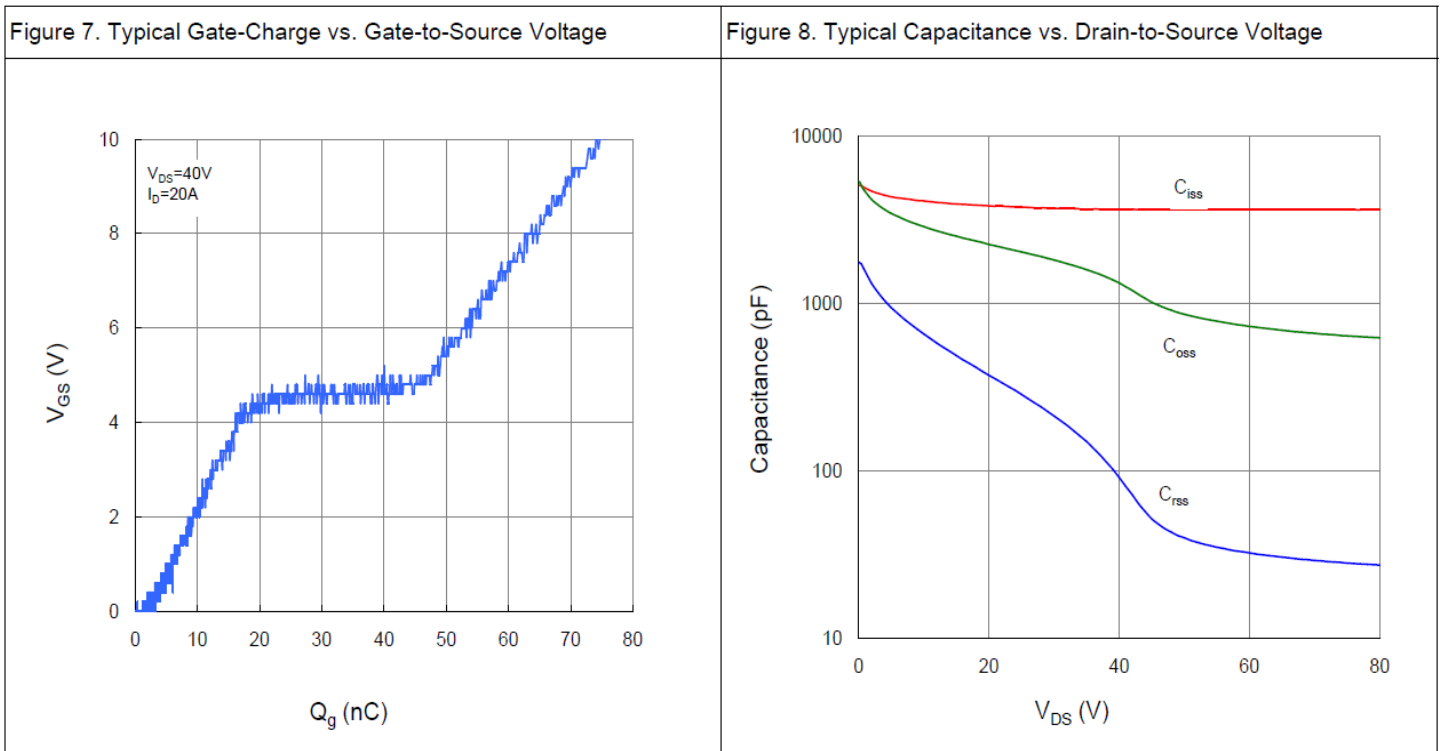
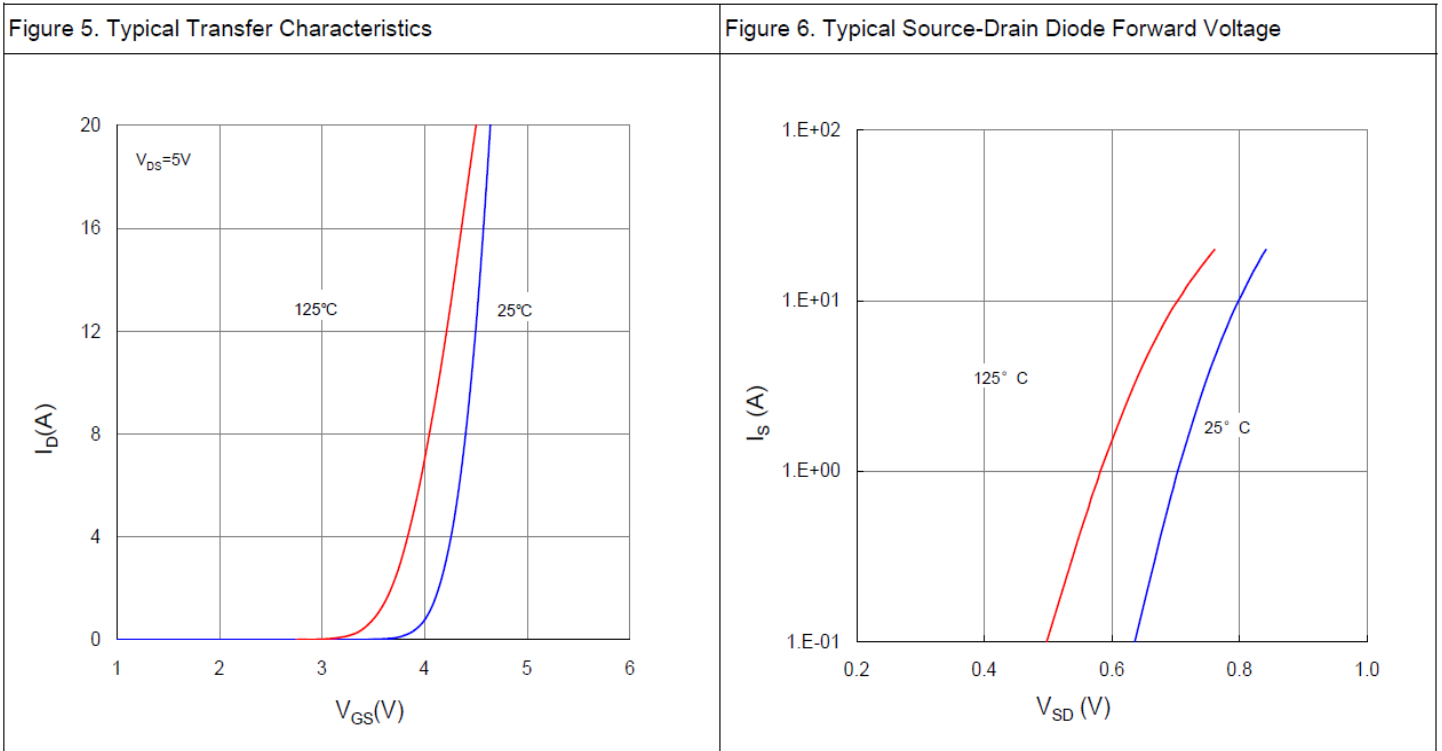


Figure 4. Normalized On-Resistance vs. Junction Temperature



Typical Operating Characteristics(Cont.)



Typical Operating Characteristics (Cont.)

Figure 9. Maximum Safe Operating Area

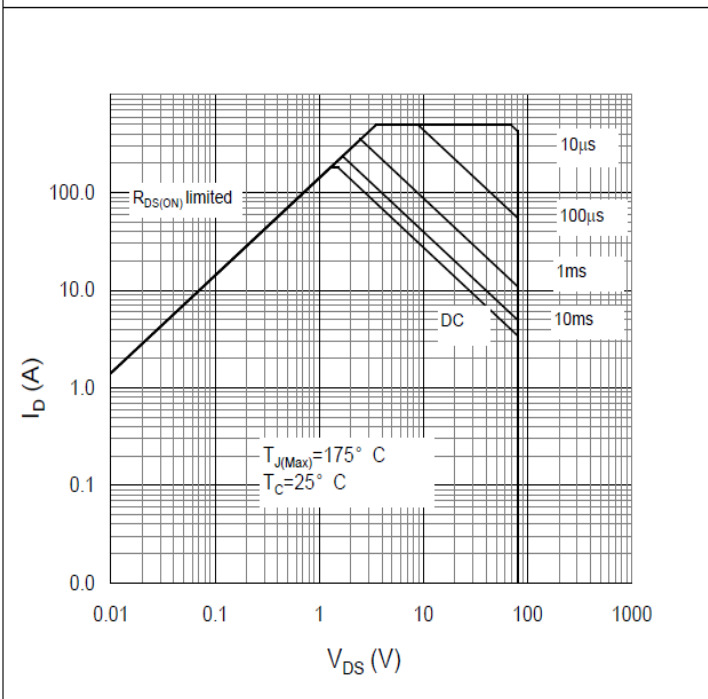


Figure 10. Maximum Drain Current vs. Case Temperature

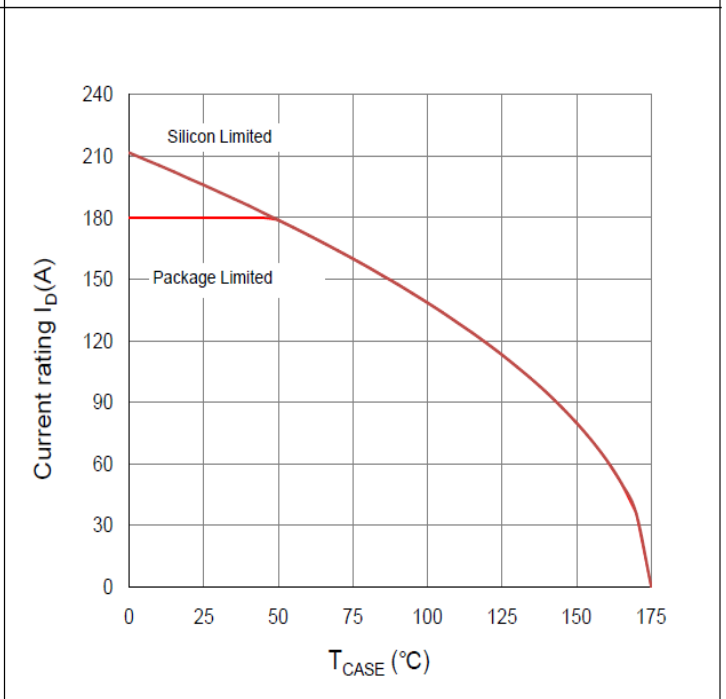
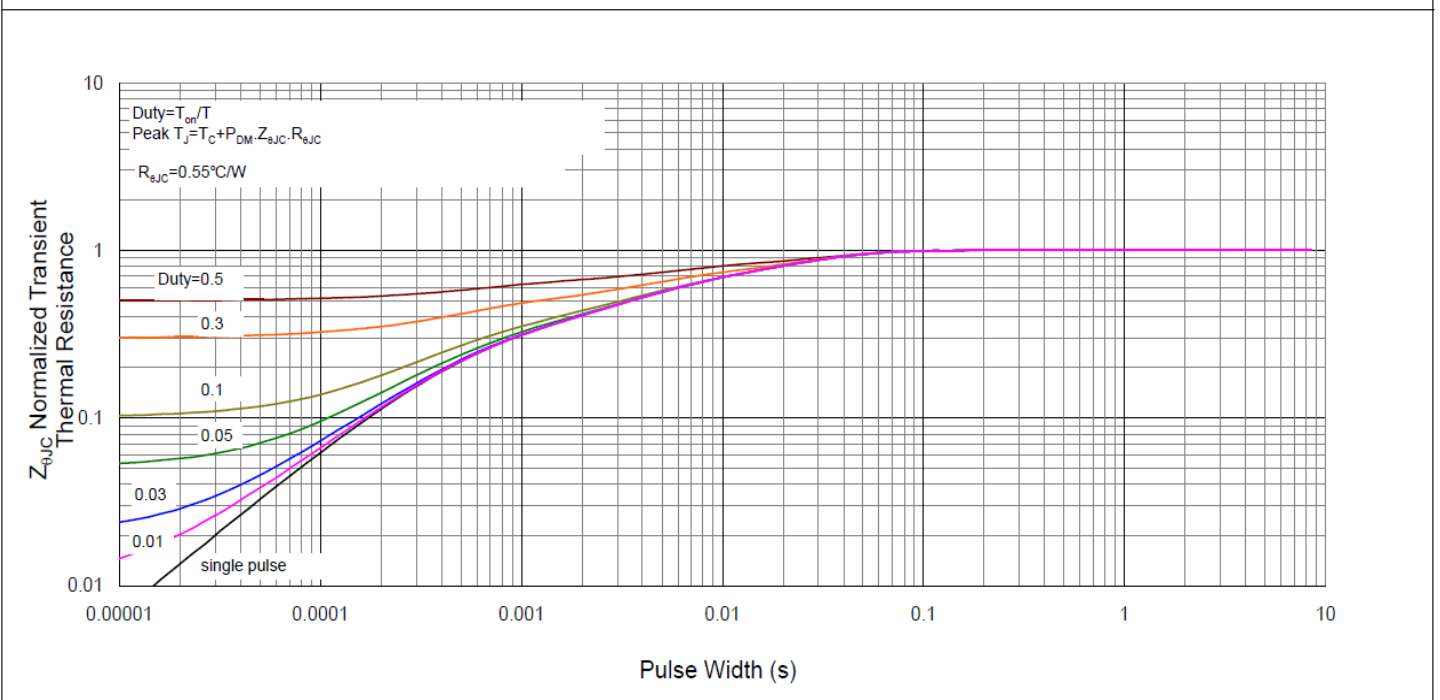
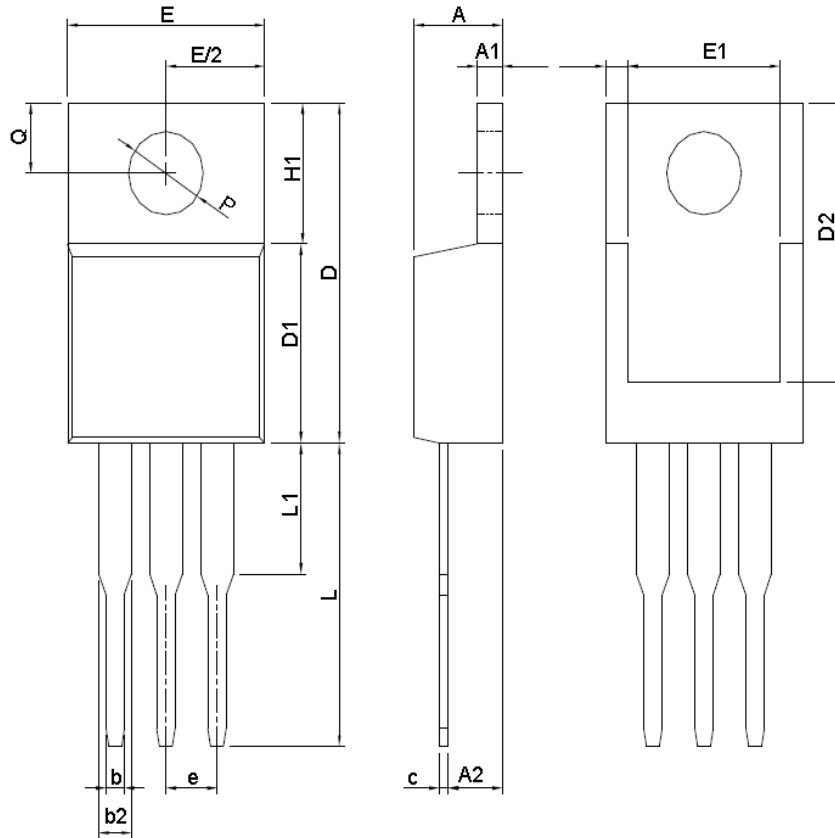


Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case



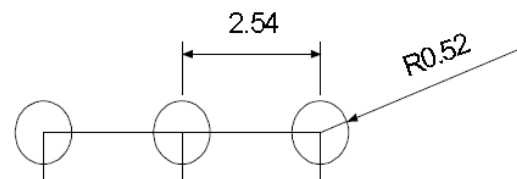
Package Information

TO220 Package



SYMBOL	TO-220			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	3.56	4.83	0.140	0.190
A1	0.51	1.40	0.020	0.055
A2	2.03	2.92	0.080	0.115
b	0.38	1.02	0.015	0.040
b2	1.14	1.78	0.045	0.070
c	0.36	0.61	0.014	0.024
D	14.22	16.51	0.560	0.650
D1	8.38	9.30	0.330	0.366
D2	12.19	13.65	0.480	0.537
E	9.65	10.67	0.380	0.420
E1	6.86	8.89	0.270	0.350
e	2.54 BSC		0.100 BSC	
H1	5.84	6.86	0.230	0.270
L	12.70	14.73	0.500	0.580
L1	-	6.35	-	0.250
P	3.53	4.09	0.139	0.161
Q	2.54	3.43	0.100	0.135

RECOMMENDED LAND PATTERN



UNIT: mm

Design Notes