

N-Channel Enhancement Mode MOSFET

TDM31210

DESCRIPTION

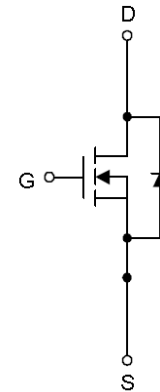
The TDM31210 uses advanced trench technology to provide excellent RDS(ON) and low gate charge. This device is suitable for use as a load switch or in PWM applications.

GENERAL FEATURES

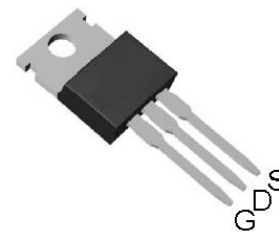
- RDS(ON) < 8.4mΩ @ VGS=10V
- High Power and current handling capability
- Lead free product is available
- TO220 Package

Application

- PWM applications
- Load switch
- Power management
- Hard Switched and High Frequency Circuits



N-Channel MOSFET



Top View of TO-220

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V _{DS}	120	V
Gate-Source Voltage	V _{GS}	±25	V
Diode Continuous Forward Current	I _S (T _C =25 °C)	80	A
Drain Currents Forward Current	I _D (T _C =25 °C)	120	A
Drain Current @ Current-Pulsed (Note 1)	I _{DM} (T _C =25 °C)	400	A
Drain Current @ Continuous	I _D (T _A =25 °C)	11	A
	I _D (T _A =70 °C)	9	A
Maximum Power Dissipation	P _D (T _C =25 °C)	250	W
	P _D (T _C =100 °C)	100	W
Maximum Power Dissipation	P _D (T _A =25 °C)	2	W
	P _D (T _A =70 °C)	1.25	W
Avalanche Current, Single pulse(L=0.5mH)	I _{AS}	45	A
Avalanche Energy, Single pulse(L=0.5mH)	E _{AS}	500	mJ
Thermal Resistance,Junction-to-Ambient (Note 1)	R _{θJA} (Steady State)	62.5	°C/W
Thermal Resistance,Junction-to-Case	R _{θJC}	0.5	°C/W
Maximum Operating Junction Temperature	T _J	150	°C
Storage Temperature Range	T _{STG}	-55 To 150	°C

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

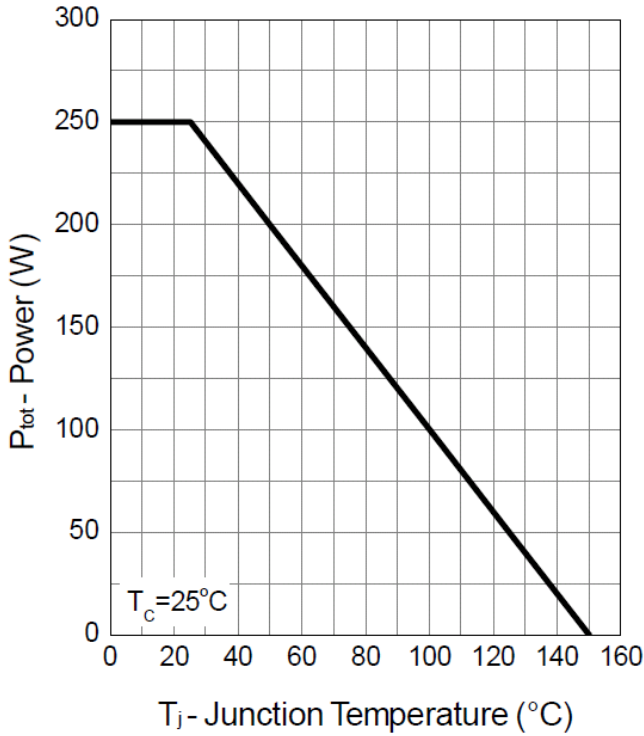
Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	120	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=96V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
ON CHARACTERISTICS (Note 2)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3	4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=40A$	-	7	8.4	m Ω
DYNAMIC CHARACTERISTICS (Note3)						
Gate Resistance	R_G	$V_{DS}=0V, V_{GS}=0V, F=1.0MHz$	-	1.0	-	Ω
Input Capacitance	C_{iss}	$V_{DS}=30V, V_{GS}=0V, F=1.0MHz$	-	6150	8000	PF
Output Capacitance	C_{oss}		-	625	-	PF
Reverse Transfer Capacitance	C_{rss}		-	120	-	PF
SWITCHING CHARACTERISTICS (Note 3)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=30V, R_L=30\Omega, V_{GEN}=10V, R_G=6\Omega$ $I_D=1A$	-	26	47	nS
Turn-on Rise Time	t_r		-	10	18	nS
Turn-Off Delay Time	$t_{d(off)}$		-	92	166	nS
Turn-Off Fall Time	t_f		-	55	99	nS
Total Gate Charge	Q_g	$V_{DS}=30V, I_D=40A, V_{GS}=10V$	-	100	140	nC
Gate-Source Charge	Q_{gs}		-	29	-	nC
Gate-Drain Charge	Q_{gd}		-	19	-	nC
Body Diode Reverse Recovery Time	T_{rr}	$I_F=40A, di/dt=100A/\mu s$	-	56	-	nS
Body Diode Reverse Recovery Charge	Q_{rr}		-	140	-	nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage (Note 2)	V_{SD}	$V_{GS}=0V, I_S=20A$	-	0.8	1.3	V

NOTES:

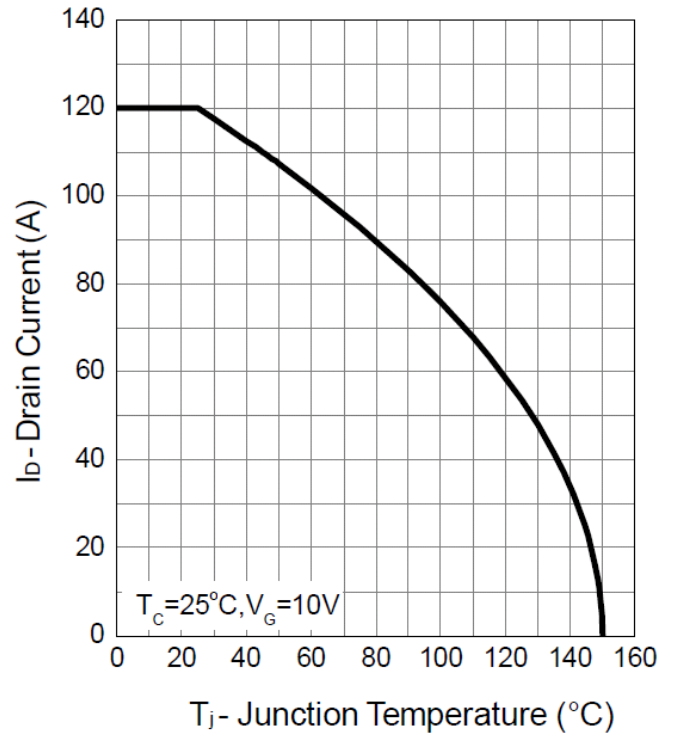
1. Pulse width limited by max. junction temperature.
2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
3. Guaranteed by design, not subject to production testing

Typical Operating Characteristics

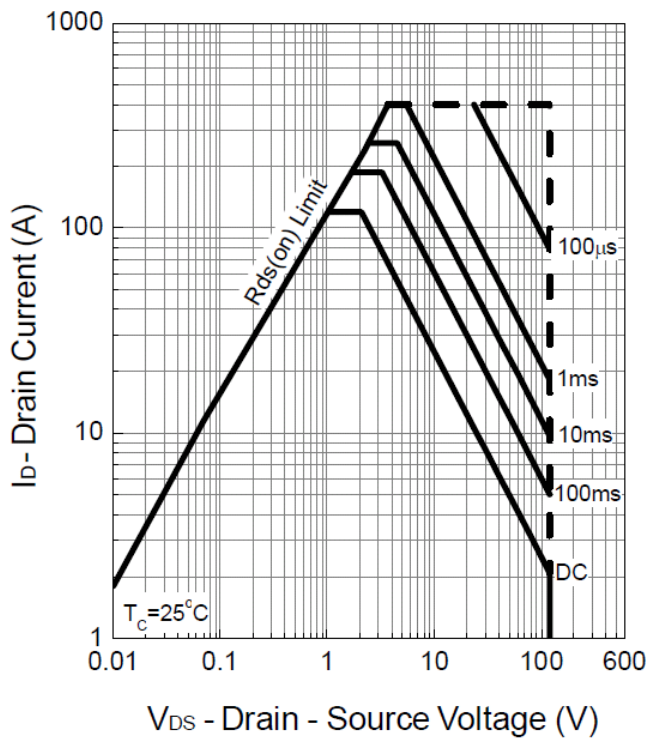
Power Dissipation



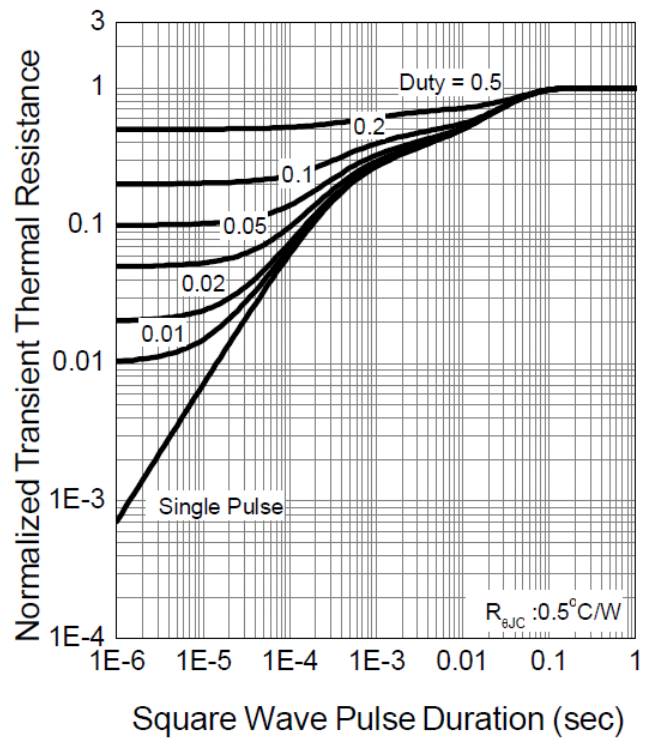
Drain Current



Safe Operation Area

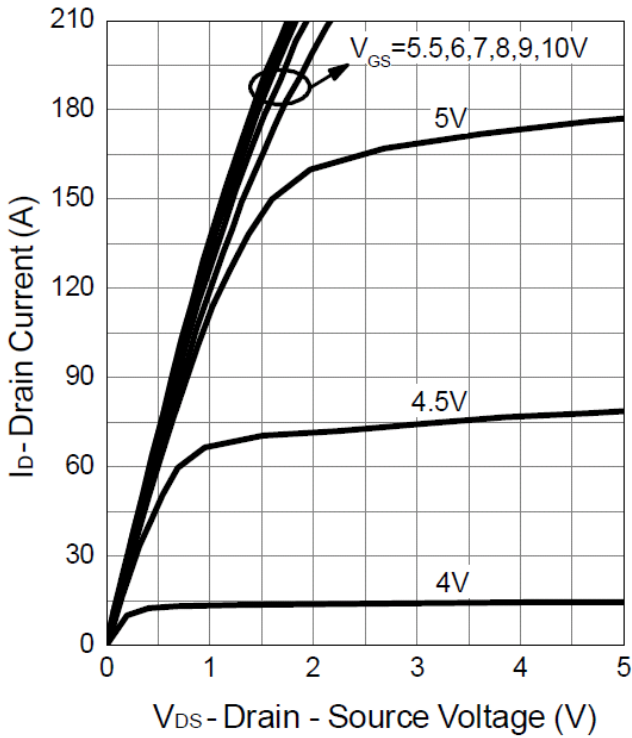


Thermal Transient Impedance

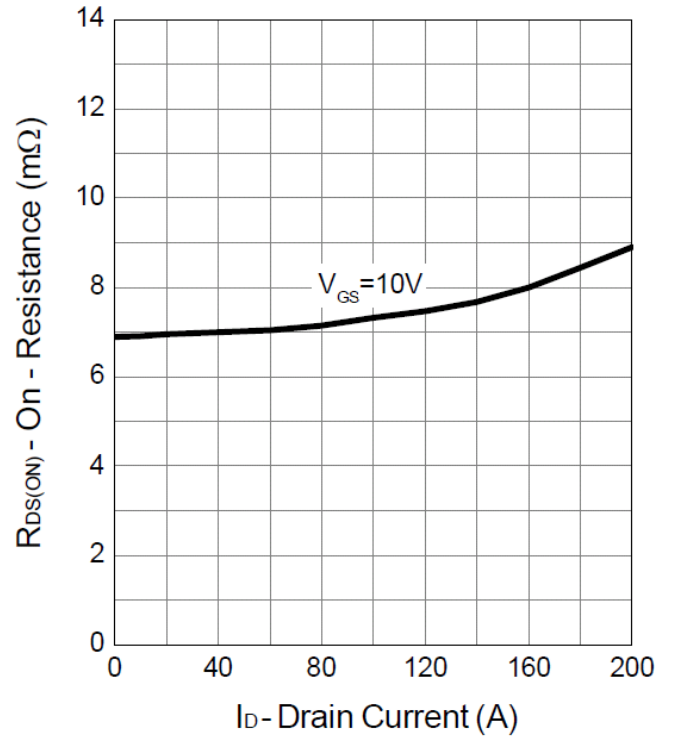


Typical Operating Characteristics(Cont.)

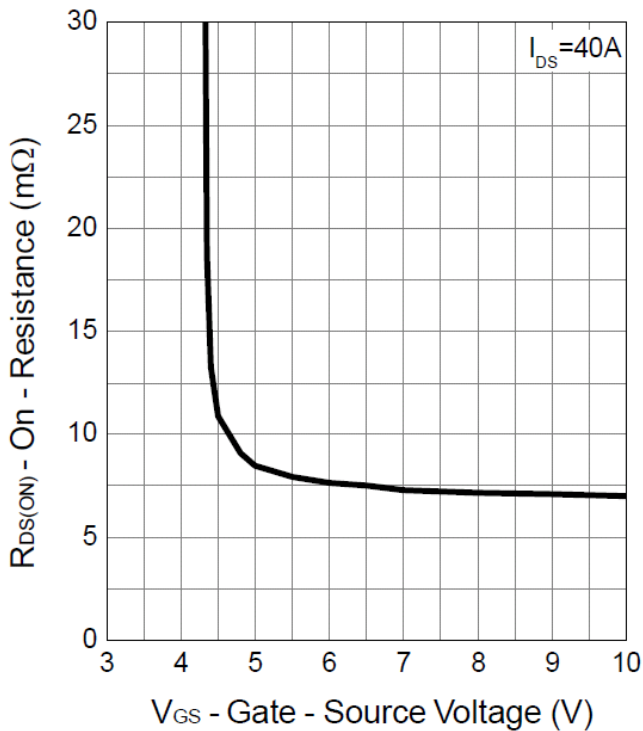
Output Characteristics



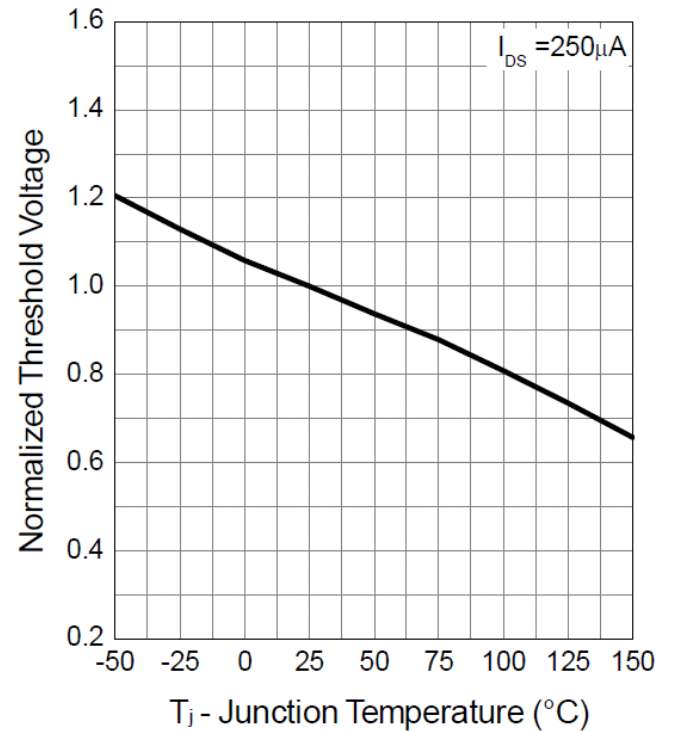
Drain-Source On Resistance



Gate-Source On Resistance

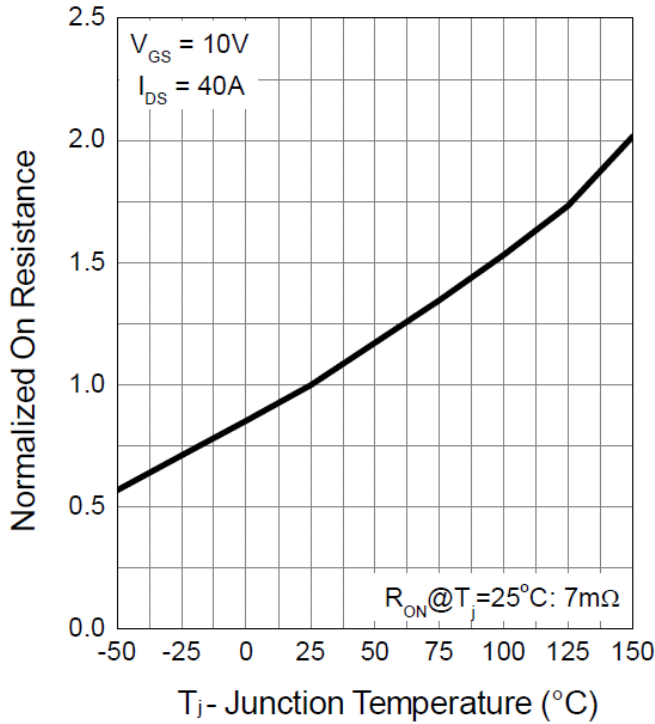


Gate Threshold Voltage

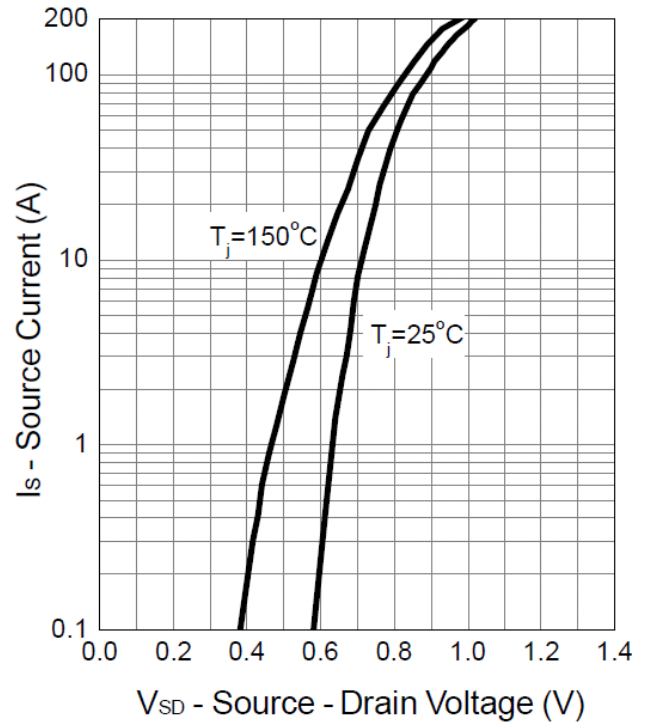


Typical Operating Characteristics(Cont.)

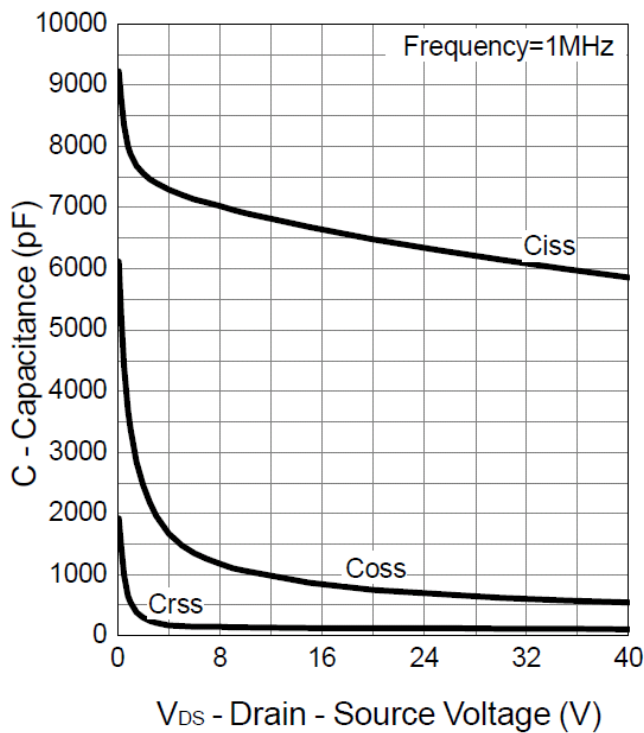
Drain-Source On Resistance



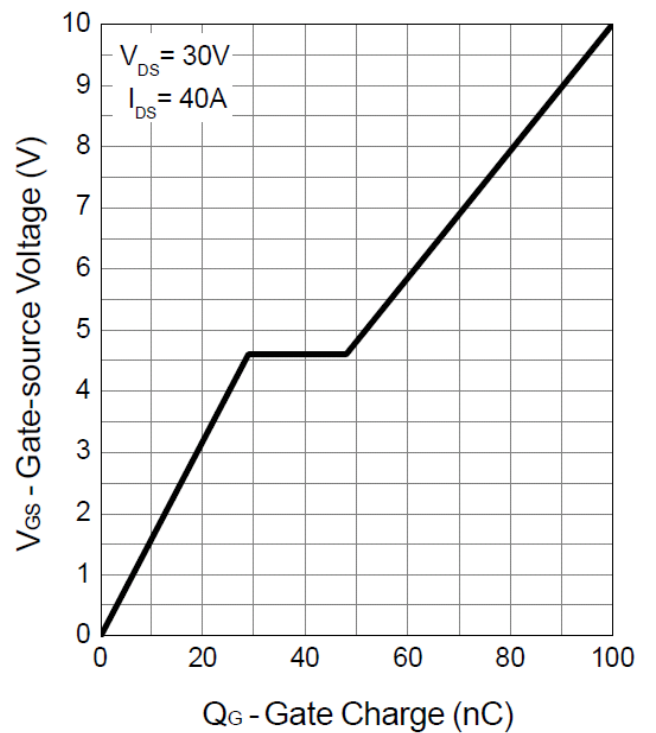
Source-Drain Diode Forward



Capacitance

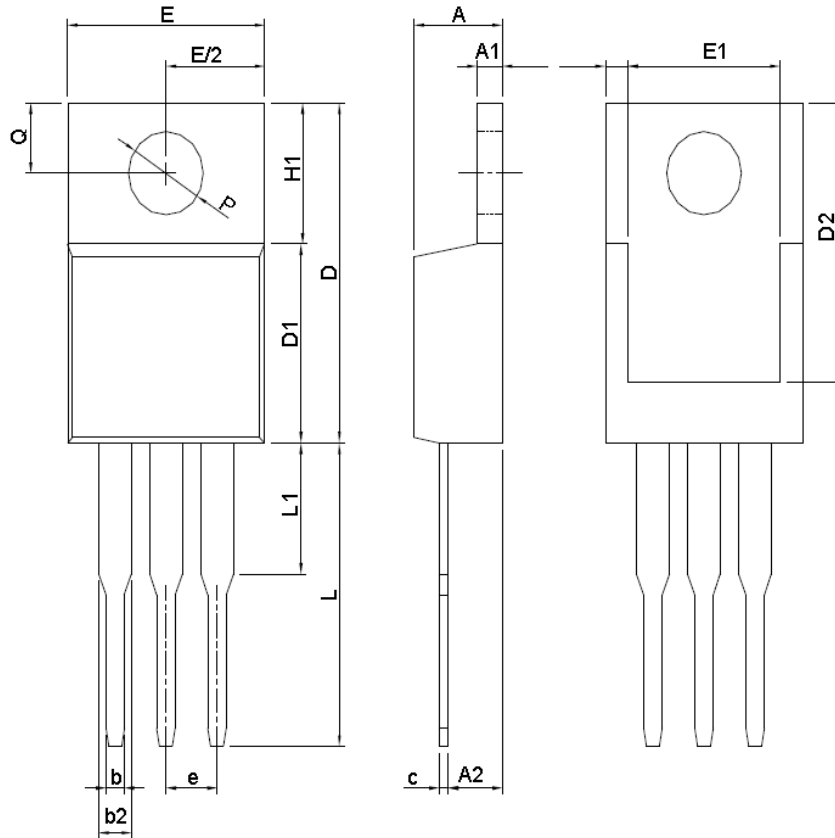


Gate Charge



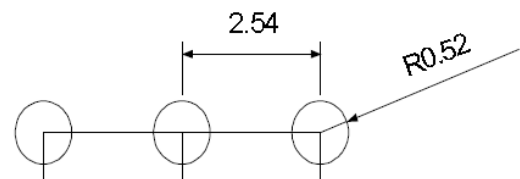
Package Information

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