

N-Channel Enhancement Mode MOSFET

TDM31210

DESCRIPTION

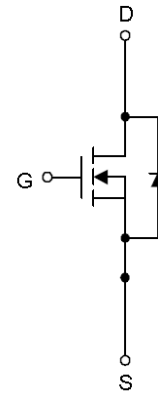
The TDM31210 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. This device is suitable for use as a load switch or in PWM applications.

GENERAL FEATURES

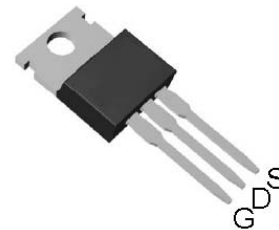
- $R_{DS(ON)} < 8.4m\Omega$ @ $V_{GS}=10V$
- High Power and current handling capability
- Lead free product is available
- TO220 Package

Application

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



N-Channel MOSFET



Top View of TO-220

ABSOLUTE MAXIMUM RATINGS($T_A=25^\circ\text{C}$ 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 ($T_C=25^\circ\text{C}$)	80	A
Drain Currents Forward Current	I_D ($T_C=25^\circ\text{C}$)	120	A
Drain Current @ Current-Pulsed (Note 1)	I_{DM} ($T_C=25^\circ\text{C}$)	400	A
Drain Current @ Continuous	I_D ($T_A=25^\circ\text{C}$)	11	A
	I_D ($T_A=70^\circ\text{C}$)	9	A
Maximum Power Dissipation	P_D ($T_C=25^\circ\text{C}$)	250	W
	P_D ($T_C=100^\circ\text{C}$)	100	W
Maximum Power Dissipation	$P_D(T_A=25^\circ\text{C})$	2	W
	$P_D(T_A=70^\circ\text{C})$	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)	$R_{\theta JA}(\text{Steady State})$	62.5	$^\circ\text{C}/\text{W}$
Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	0.5	$^\circ\text{C}/\text{W}$
Maximum Operating Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-55 To 150	$^\circ\text{C}$

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

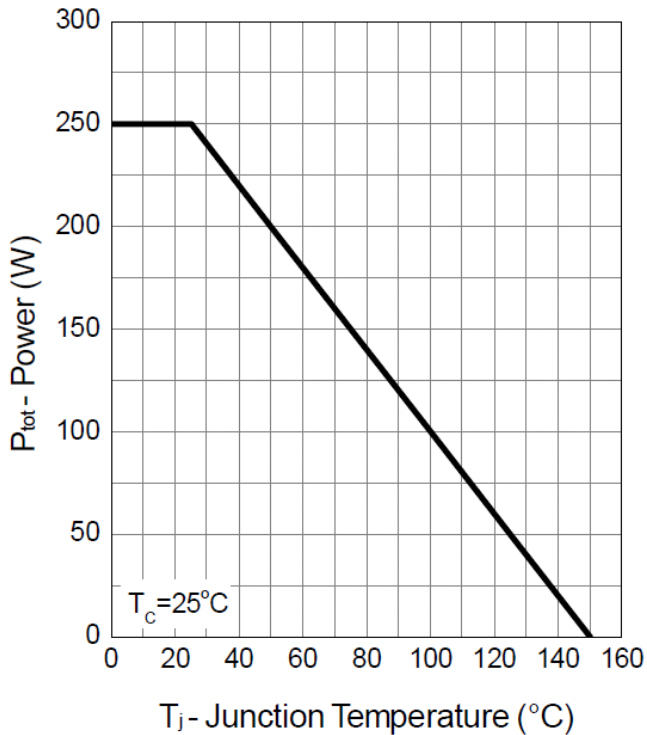
Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	120	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =96V,V _{GS} =0V	-	-	1	μ A
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V,V _{DS} =0V	-	-	±100	nA
ON CHARACTERISTICS (Note 2)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	2	3	4	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =40A	-	7	8.4	mΩ
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 =30Ω, V _{GEN} =10V,R _G =6Ω 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/μs	-	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:

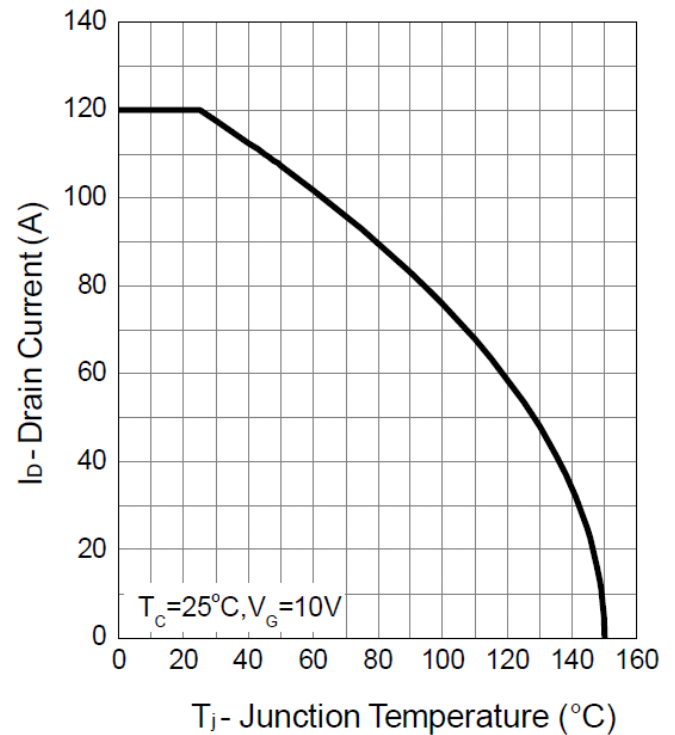
1. Pulse width limited by max. junction temperature.
2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
3. Guaranteed by design, not subject to production testing

Typical Operating Characteristics

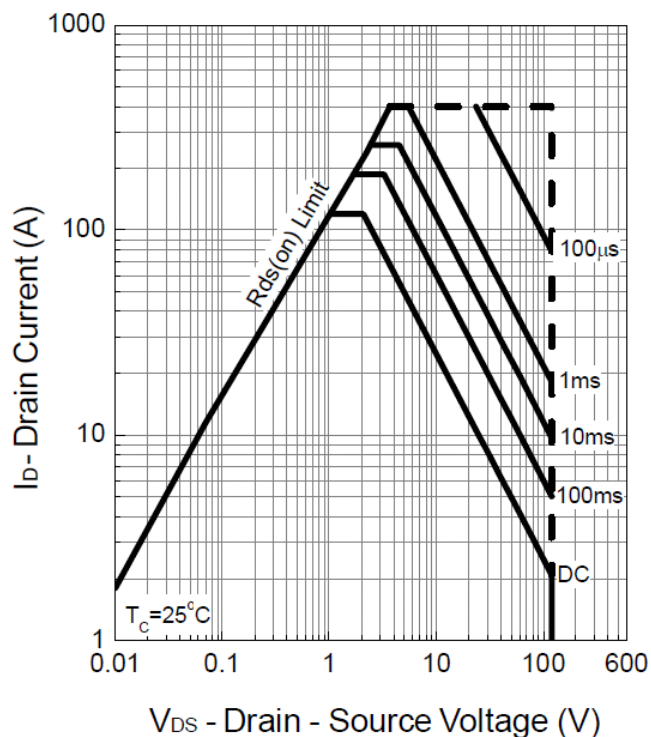
Power Dissipation



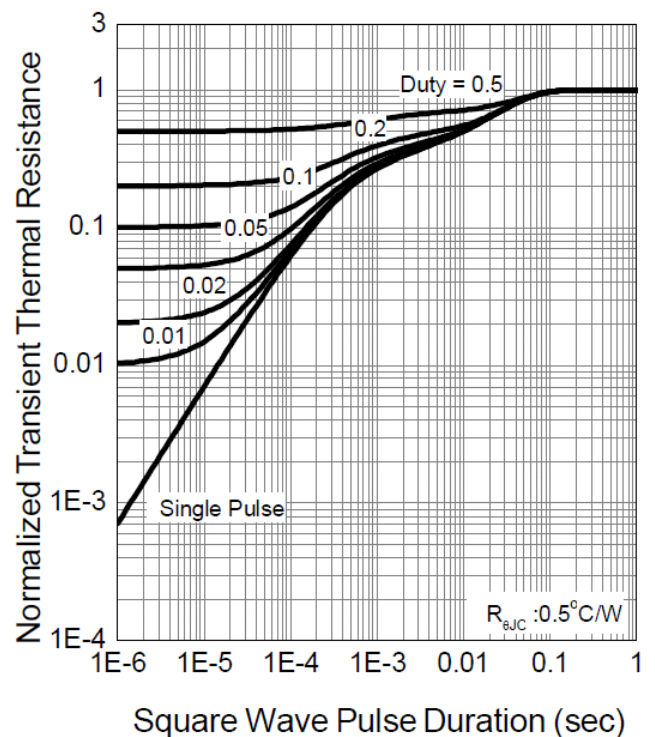
Drain Current



Safe Operation Area

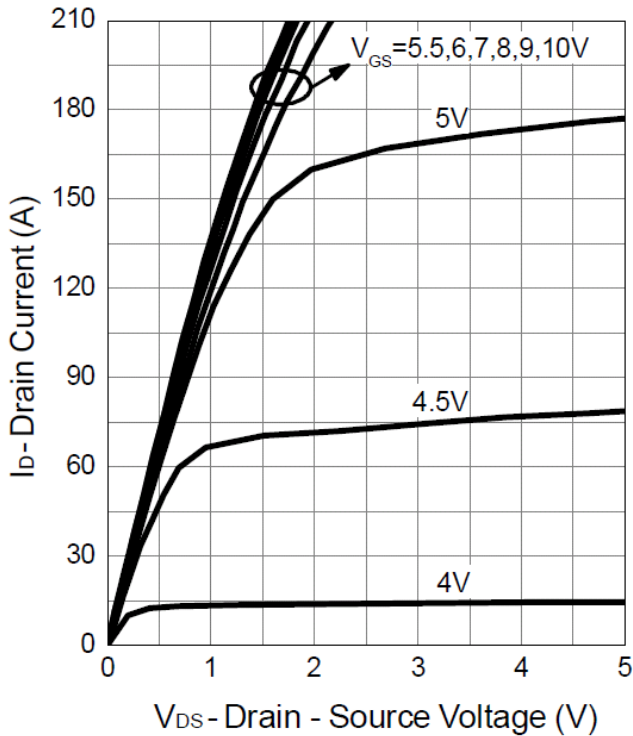


Thermal Transient Impedance

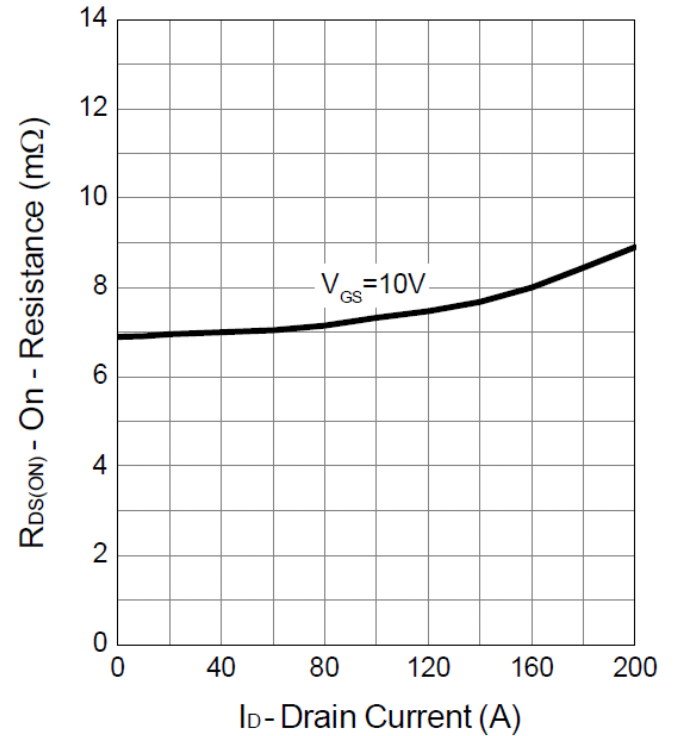


Typical Operating Characteristics(Cont.)

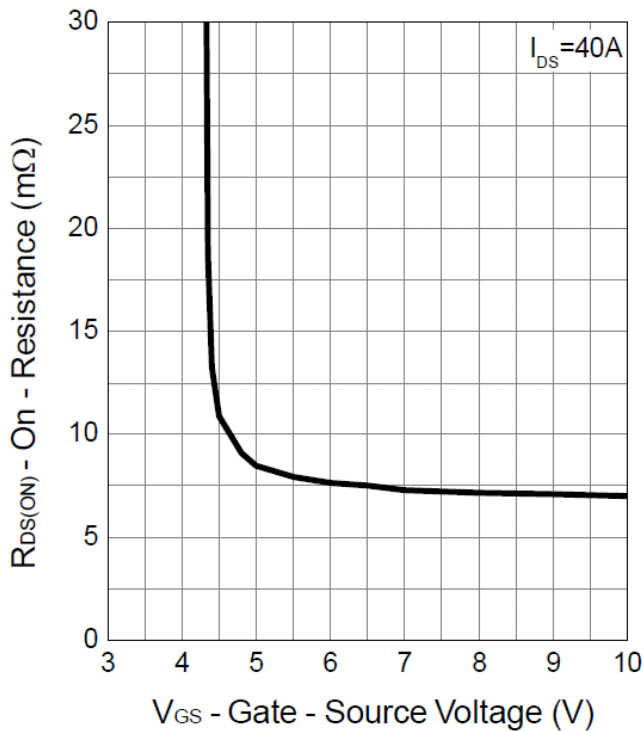
Output Characteristics



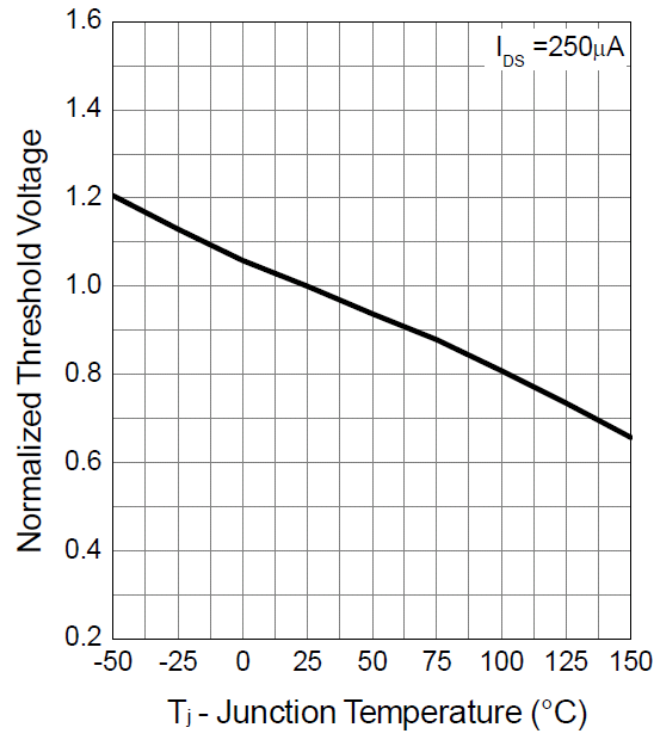
Drain-Source On Resistance



Gate-Source On Resistance

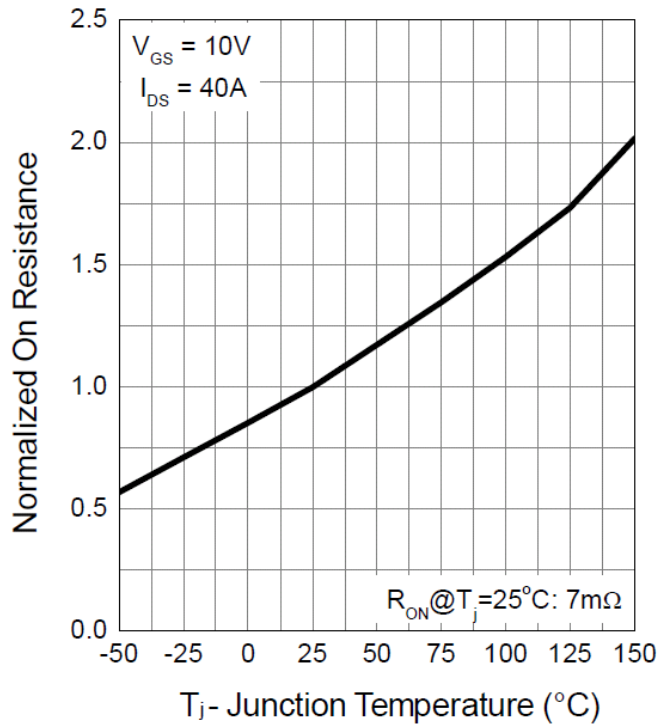


Gate Threshold Voltage

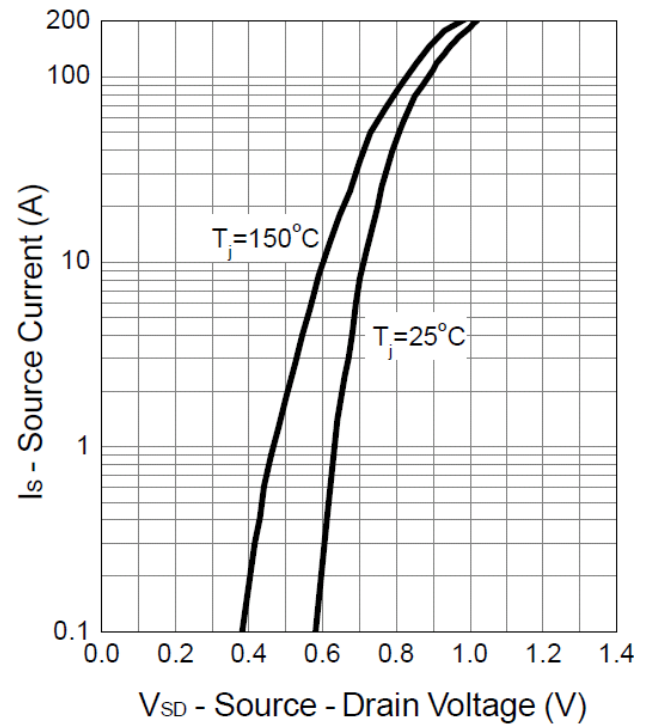


Typical Operating Characteristics(Cont.)

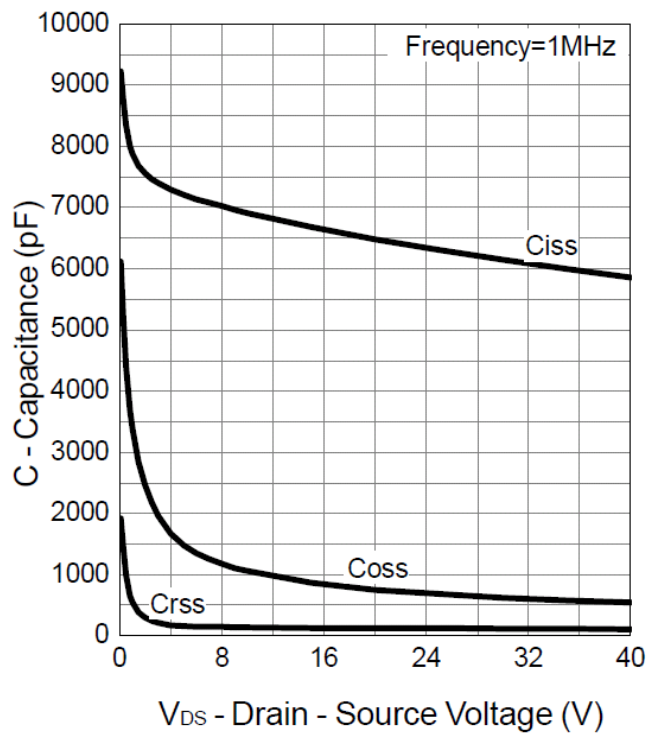
Drain-Source On Resistance



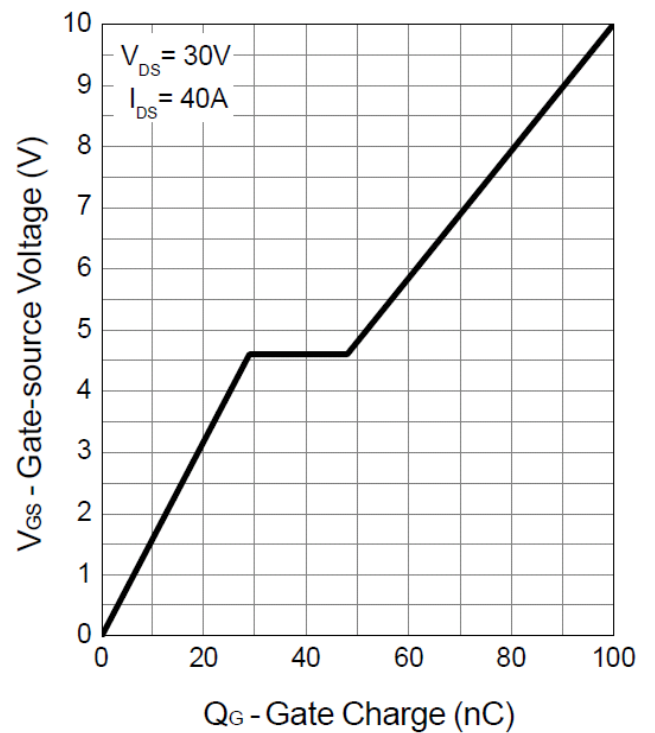
Source-Drain Diode Forward



Capacitance



Gate Charge

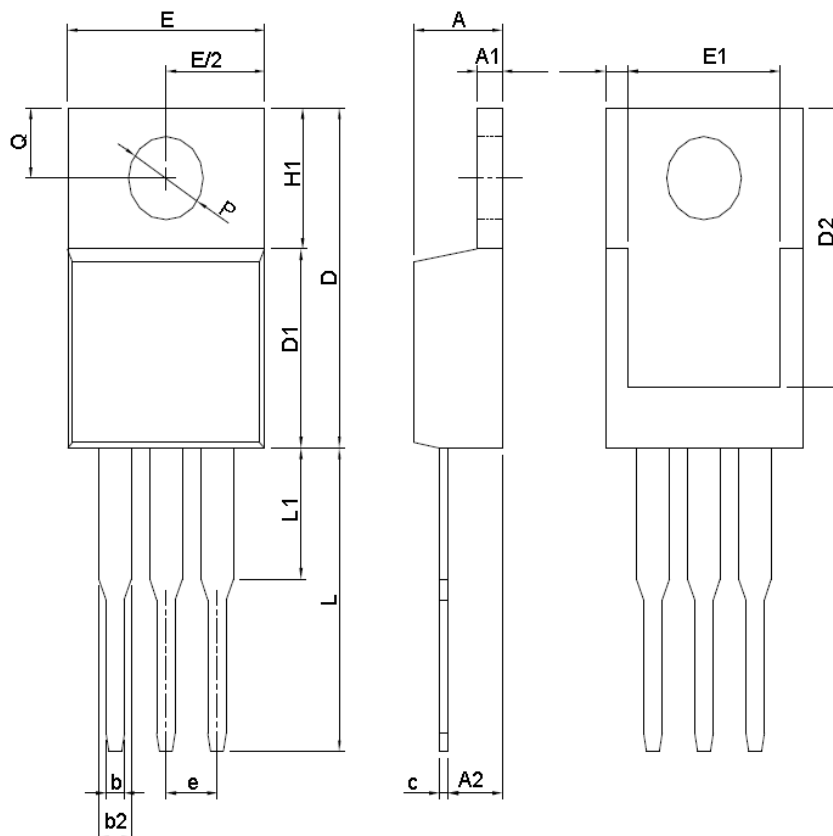


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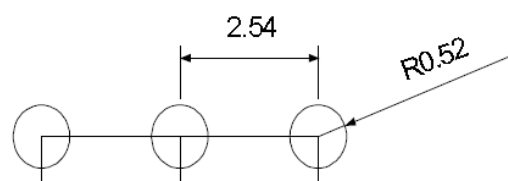
Package Information

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