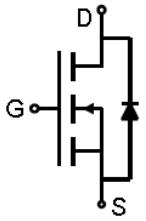
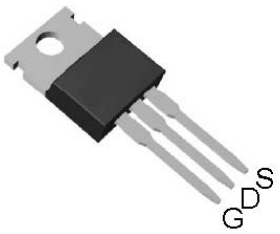
N-Channel Enhancement Mode MOSFET TDM31026

DESCRIPTION

The TDM31026 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.



Schematic diagram



Top View of TO-220

GENERAL FEATURES

- 100V/120A
  RDS(ON) < 4.5mΩ @ VGS=10V
- High Power and current handling capability
- Lead free product is available
- TO220 Package

Application

- High Efficiency Synchronous Rectification in SMPS.
- Uninterruptible Power Supply.
- Motor Drives.

ABSOLUTE MAXIMUM RATINGS(T_A=25℃unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	±20	V
Diode Continuous Forward Current	I_S	70	A
Drain Current @ Current-Pulsed (Note 2)	I_{DM}（T_C=25℃）	400	A
Drain Current @ Continuous	I_D（T_C=25℃）	120	A
	I_D（T_C=100℃）	91	A
Maximum Power Dissipation	P_D（T_C=25℃）	192	W
	P_D（T_C=100℃）	76	W
Drain Current @ Continuous	I_D（T_A=25℃）	14.9	A
	I_D（T_A=70℃）	11.9	A
Maximum Power Dissipation	P_D（T_A=25℃）	2.0	W
	P_D（T_A=70℃）	1.28	W
Avalanche Current, Single pulse	I_{AS}(L=0.5mH)	45	A
Avalanche Energy, Single pulse	E_{AS}(L=0.5mH)	506	mJ

THERMAL CHARACTERISTICS

Thermal Resistance,Junction-to-Ambient (Note 3)	$R_{\theta JA}$	62.5	℃/W
Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	0.65	℃/W
Maximum Junction Temperature	T_J	150	℃
Operating Junction and Storage Temperature Range	T_{STG}	-55 To 150	℃

ELECTRICAL CHARACTERISTICS (T_A=25℃unless otherwise noted)

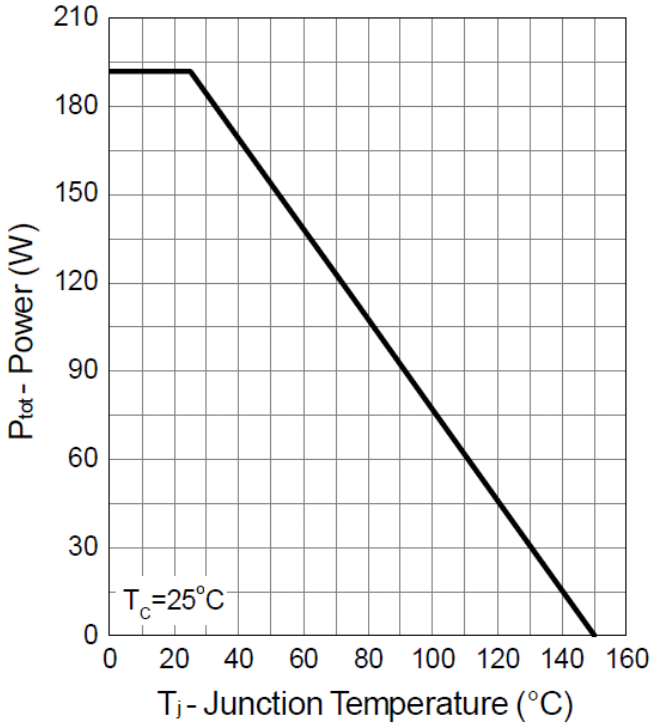
Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	100	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=80V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
ON CHARACTERISTICS (Note 4)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=VGS,I_D=250μA	2	3	4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=40A	-	3.7	4.5	mΩ
DYNAMIC CHARACTERISTICS (Note4)						
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	-	4020	5230	PF
Output Capacitance	C_{oss}		-	1810	-	PF
Reverse Transfer Capacitance	C_{rss}		-	81	-	PF
SWITCHING CHARACTERISTICS (Note 5)						
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=30V, R_L=30Ω,	-	20	36	nS
Turn-on Rise Time	t_r	I_{DS}-1A,V_{GS}=10V,RG=6Ω	-	18	33	nS
Turn-Off Delay Time	$t_{d(off)}$		-	66	119	nS
Turn-Off Fall Time	t_f		-	130	234	nS
Total Gate Charge	Q_g	V_{DS}=50V,I_D=40A,V_{GS}=10V	-	78	110	nC
Gate-Source Charge	Q_{gs}		-	20	-	nC
Gate-Drain Charge	Q_{gd}		-	24	-	nC
Body Diode Reverse Recovery Time	T_{rr}	I_F=40A, dI/dt=100A/μs	-	70	-	nS
Body Diode Reverse Recovery Charge	Q_{rr}		-	160	-	nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage (Note 4)	V_{SD}	V_{GS}=0V,I_S=50A	-	0.8	1.3	V

NOTES:

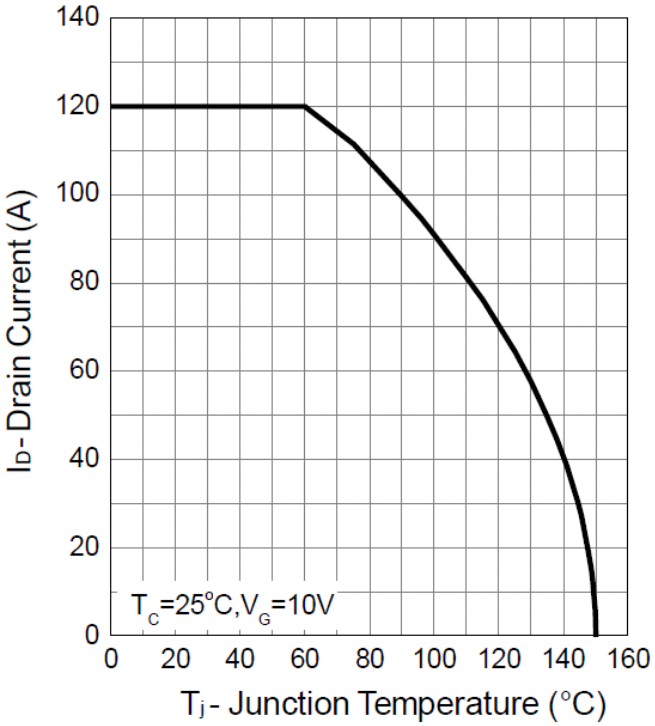
1. IDmax. current limited by Package.
2. Pulse width limited by Junction temperature.
3. Surface Mounted on 1in2 FR4 Board, t ≤ 999 sec.
4. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
5. Guaranteed by design, not subject to production testing

Typical Operating Characteristics

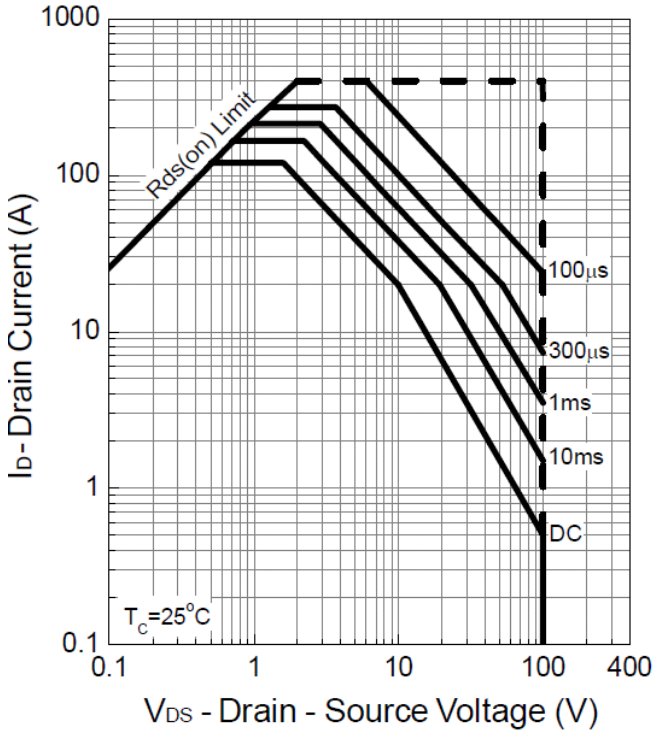
Power Dissipation



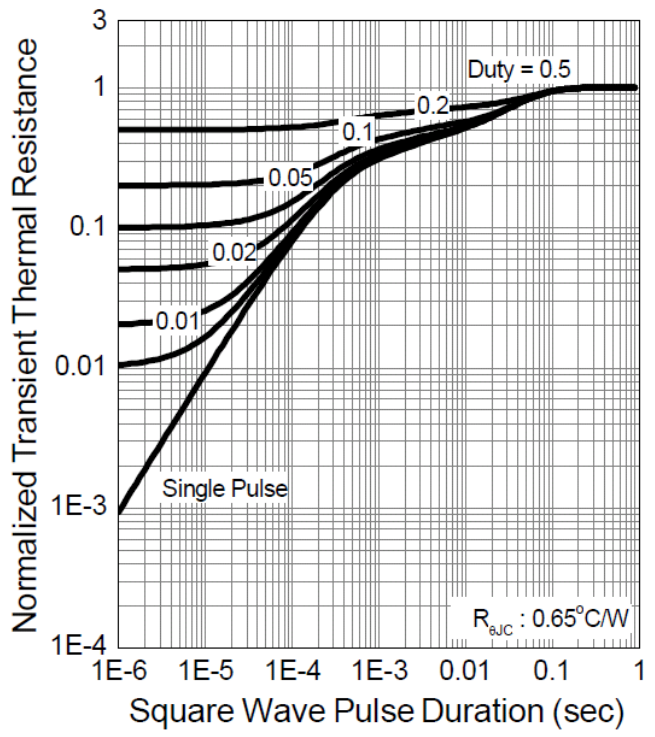
Drain Current



Safe Operation Area

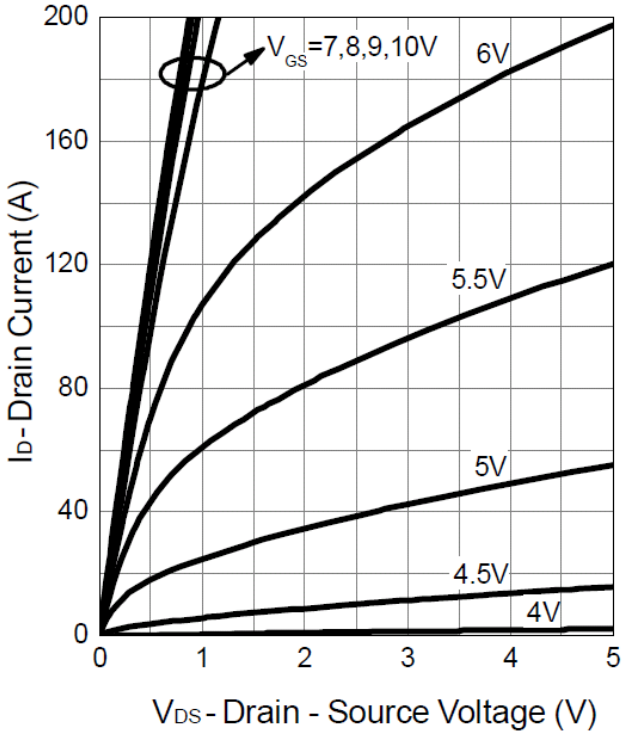


Thermal Transient Impedance

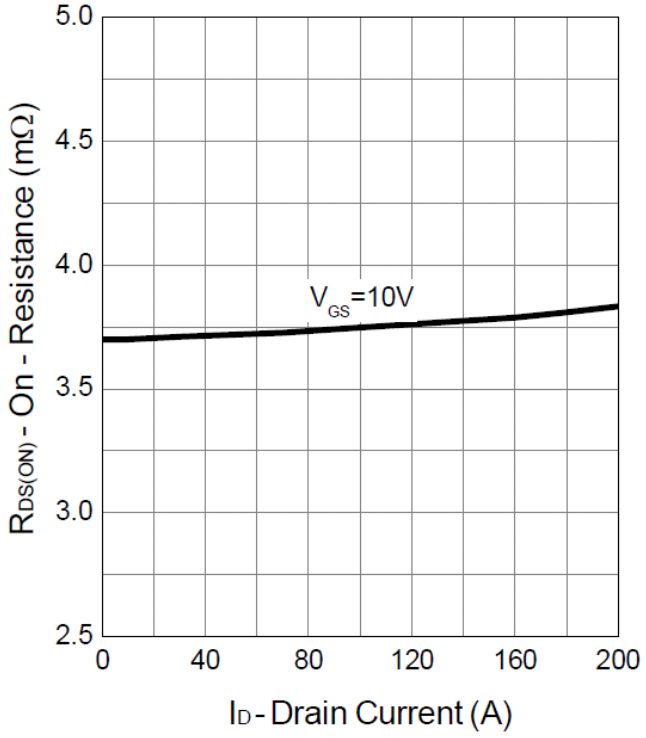


Typical Operating Characteristics(Cont.)

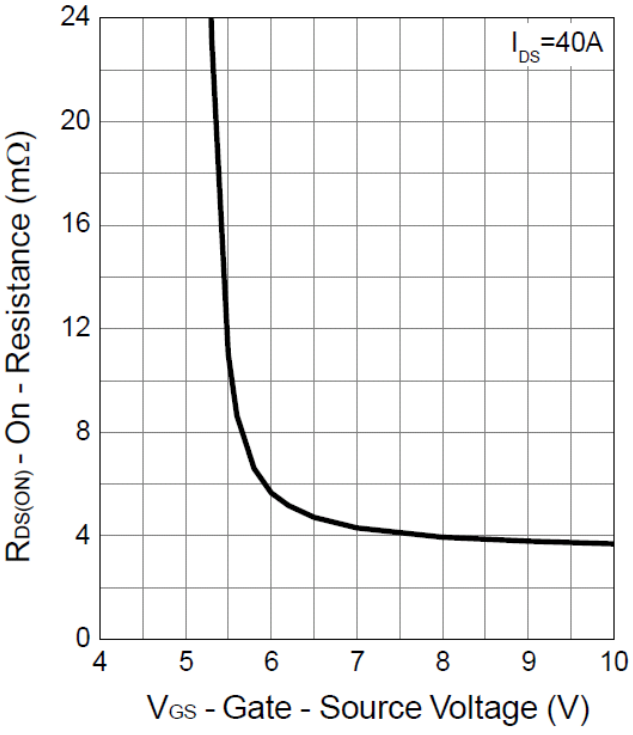
Output Characteristics



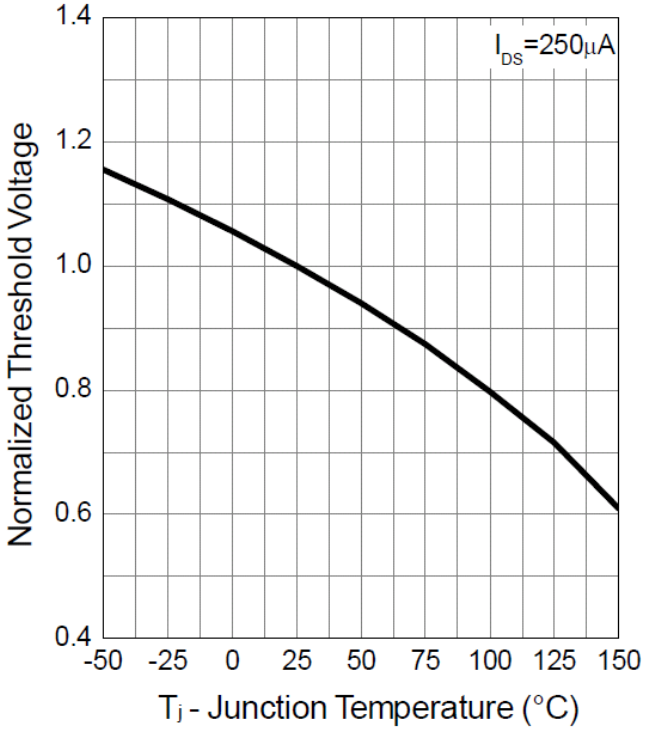
Drain-Source On Resistance



Gate-Source On Resistance

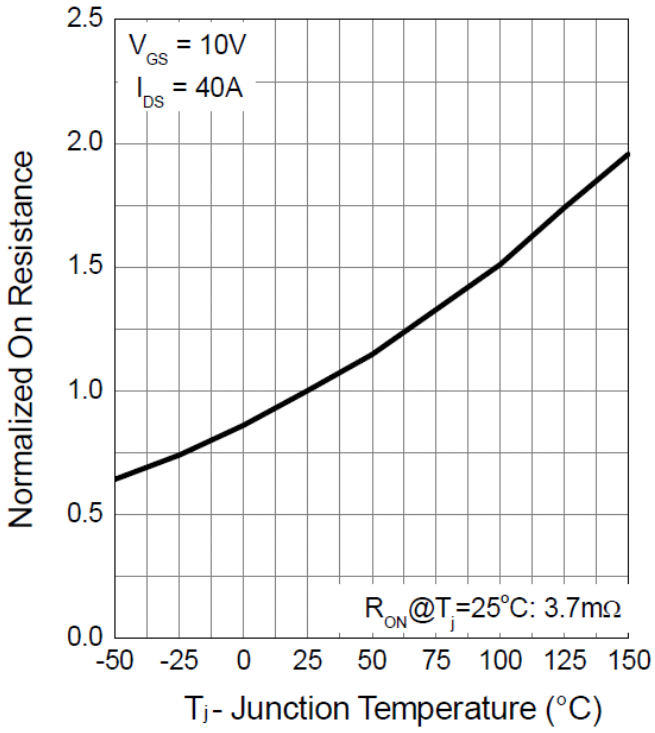


Gate Threshold Voltage

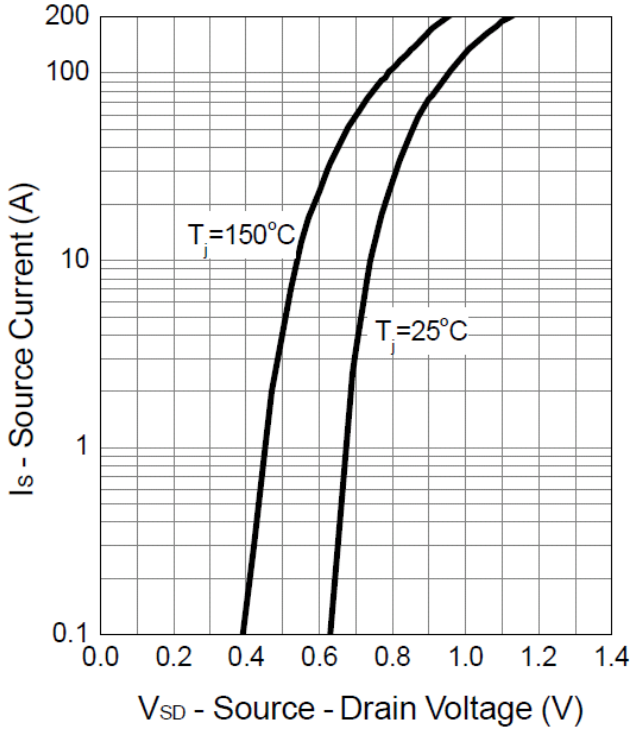


Typical Operating Characteristics(Cont.)

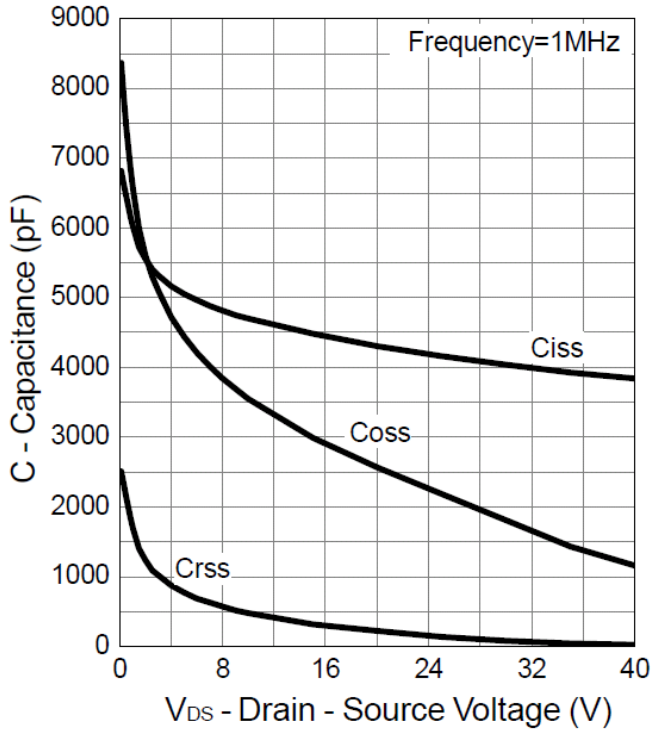
Drain-Source On Resistance



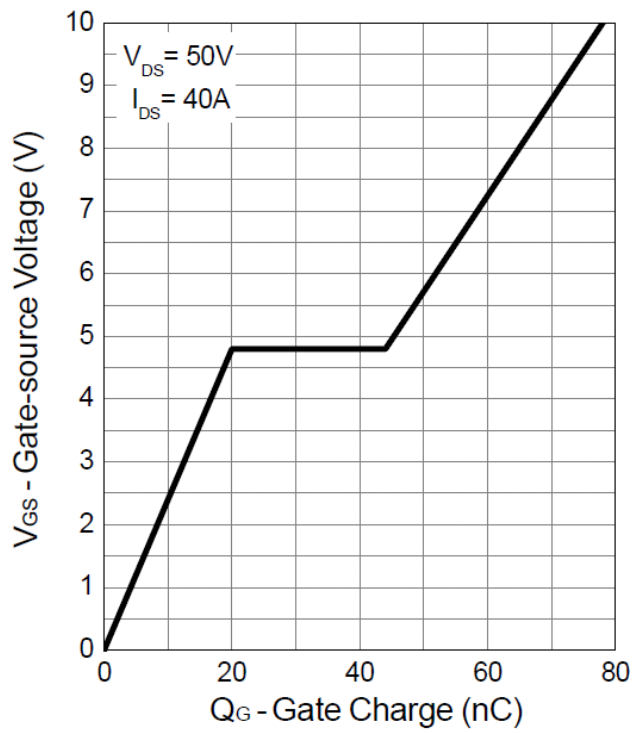
Source-Drain Diode Forward



Capacitance

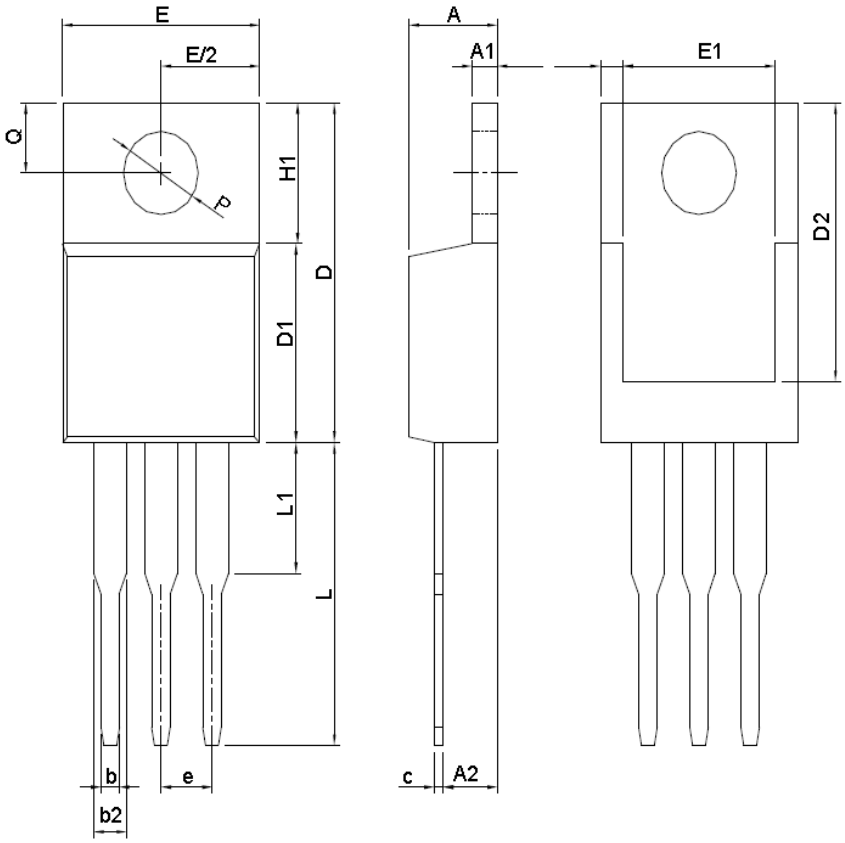


Gate Charge



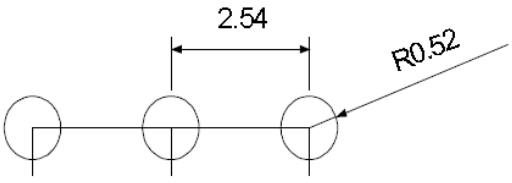
Package Information

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