N-Channel Enhancement Mode MOSFET   TDM31064

DESCRIPTION

The TDM31064 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) < 18.8mΩ @ VGS=4.5V
  RDS(ON) < 14.0mΩ @ VGS=10V
- High Power and current handling capability
- Lead free product is available
- TO-220 Package

Application

- PWM applications
- Load switch
- Power management
- Hard Switched and High Frequency Circuits
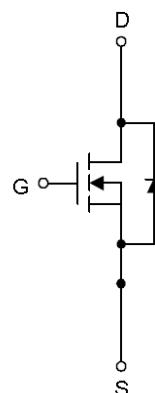
N-Channel MOSFET
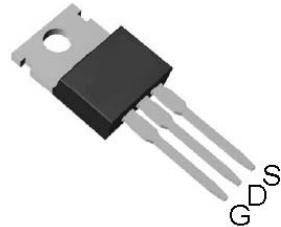
Top View of TO-220

ABSOLUTE MAXIMUM RATINGS(T$_A$=25℃ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V$_{DS}$	100	V
Gate-Source Voltage	V$_{GS}$	$\pm$20	V
Diode Continuous Forward Current	I$_{S}$（Tc=25℃）	21	A
Pulsed Drain Current	I$_{DM}$（Tc=25℃）	172	A
Drain Current @ Continuous	I$_{D}$（Tc=25℃）	54	A
	I$_{D}$（Tc=100℃）	30	A
Maximum Power Dissipation(t≤10s)	P$_{D(Tc=25℃)}$	104	W
	P$_{D(Tc=100℃)}$	45	W
Drain Current @ Continuous	I$_{D}$（TA=25℃）	7.2	A
	I$_{D}$（TA=70℃）	5.8	A
Maximum Power Dissipation(t≤10s)	P$_{D(TA=25℃)}$	2	W
	P$_{D(TA=70℃)}$	1.25	W
Thermal Resistance,Junction-to-Case	R$_{θJC}$	1.1	℃/W
Thermal Resistance,Junction-to-Ambient (Note 1)	R$_{θJA}$(Steady State)	62.5	℃/W
Avalanche Current, Single pulse	I$_{AS(L=0.5mH)}$	18	A
Avalanche Energy, Single pulse	E$_{AS(L=0.5mH)}$	81	mJ
Maximum Operating Junction Temperature	T$_{J}$	150	℃
Storage Temperature Range	T$_{STG}$	-55 To 150	℃

N-Channel Enhancement Mode MOSFET TDM31064

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 2)						
Gate Threshold Voltage	V$_{GS(th)}$	V$_{DS}$=VGS,I$_D$=250µA	1	2	3	V
Drain-Source On-State Resistance	R$_{DS(ON)}$	V$_{GS}$=4.5V, I$_D$=15A	-	14	18.8	mΩ
	R$_{DS(ON)}$	V$_{GS}$=10V, I$_D$=20A	-	11.2	14.0	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	-	1440	1880	PF
Output Capacitance	C$_{oss}$		-	405	-	PF
Reverse Transfer Capacitance	C$_{rss}$		-	30	-	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	-	16	29	nS
Turn-on Rise Time	t$_r$		-	7	13	nS
Turn-Off Delay Time	t$_{d(off)}$		-	38	69	nS
Turn-Off Fall Time	t$_f$		-	41	74	nS
Total Gate Charge	Q$_g$	V$_{DS}$=50V,I$_D$=20A,V$_{GS}$=10V	-	28	40	nC
Gate-Source Charge	Q$_{gs}$		-	4.8	-	nC
Gate-Drain Charge	Q$_{gd}$		-	5.8	-	nC
Body Diode Reverse Recovery Time	T$_{rr}$	I$_F$=20A, dI/dt=100A/µs	-	45	-	nS
Body Diode Reverse Recovery Charge	Q$_{rr}$		-	86	-	nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage (Note 2)	V$_{SD}$	V$_{GS}$=0V,I$_S$=2A	-	0.8	1.3	V

NOTES:

1. Pulse width limited by max. junction temperature.

2. Pulse Test: Pulse Width ≤ 300µs, Duty Cycle ≤ 2%.

3. Guaranteed by design, not subject to production testing

Typical Operating Characteristics

Power Dissipation

$T_C = 25^\circ C$

T_j - Junction Temperature ($^\circ$C)

P_{tot} - Power (W)

Drain Current

$T_C = 25^\circ C, V_G = 10V$

T_j - Junction Temperature

I_D - Drain Current (A)

Safe Operation Area

Rds(on) Limit

100μs

300μs

1ms

10ms

DC

$T_C = 25^\circ C$

V_{DS} - Drain - Source Voltage (V)

I_D - Drain Current (A)

Thermal Transient Impedance

Duty = 0.5

0.2

0.1

0.05

0.02

0.01

Single Pulse

$R_{\theta JC}$: 2.4°C/W

Square Wave Pulse Duration (sec)

Normalized Transient Thermal Resistance
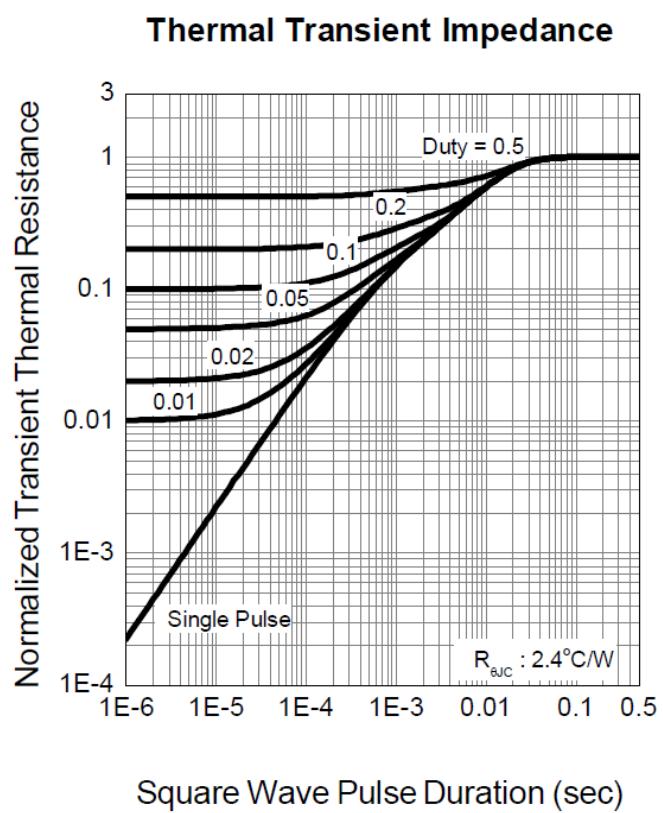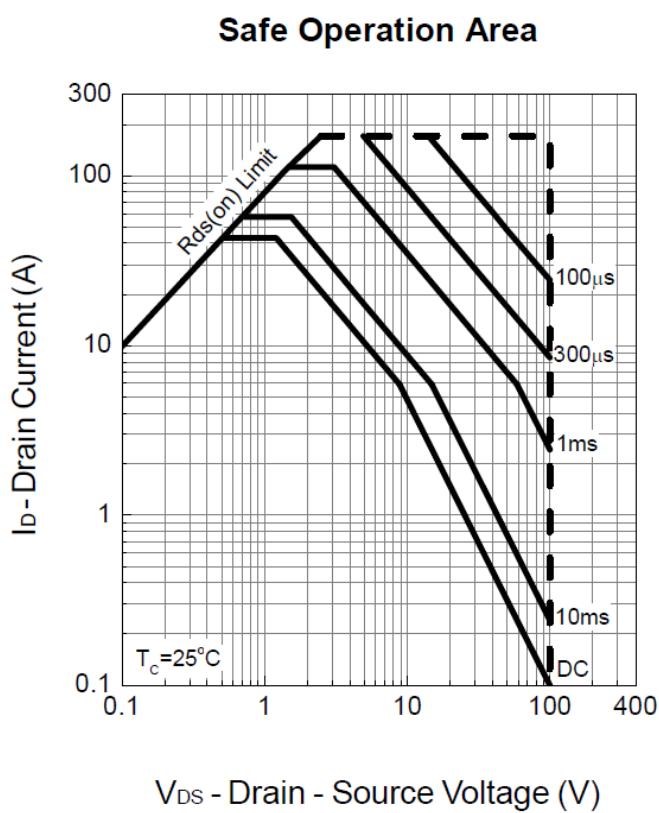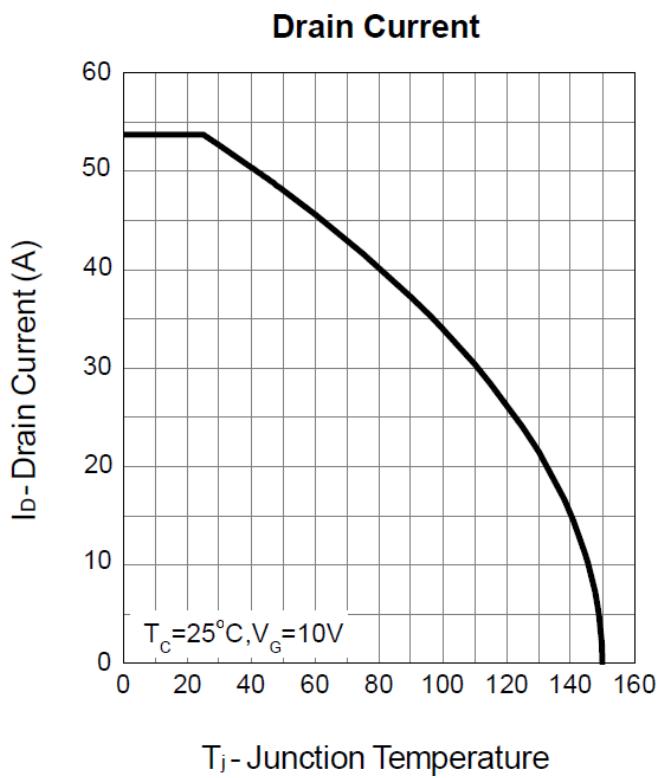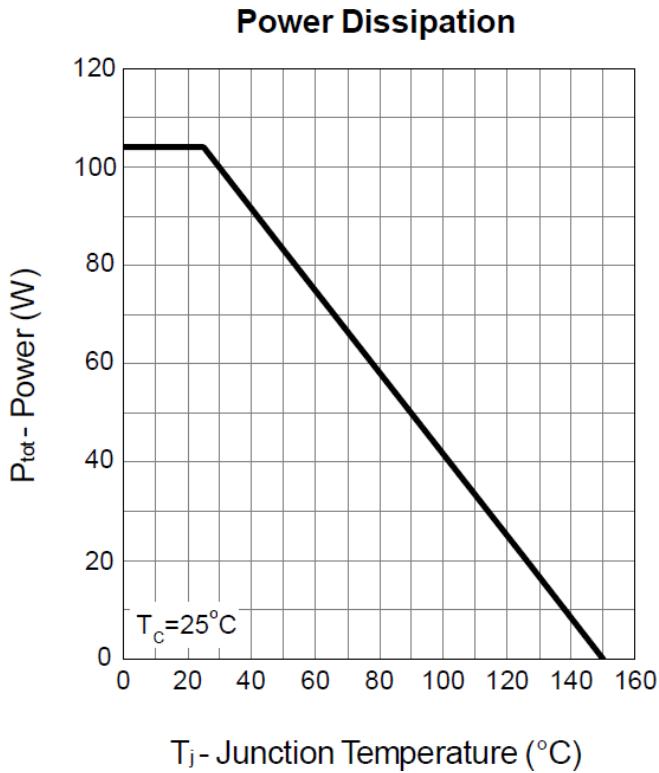
## Typical Operating Characteristics (Cont.)

Output Characteristics
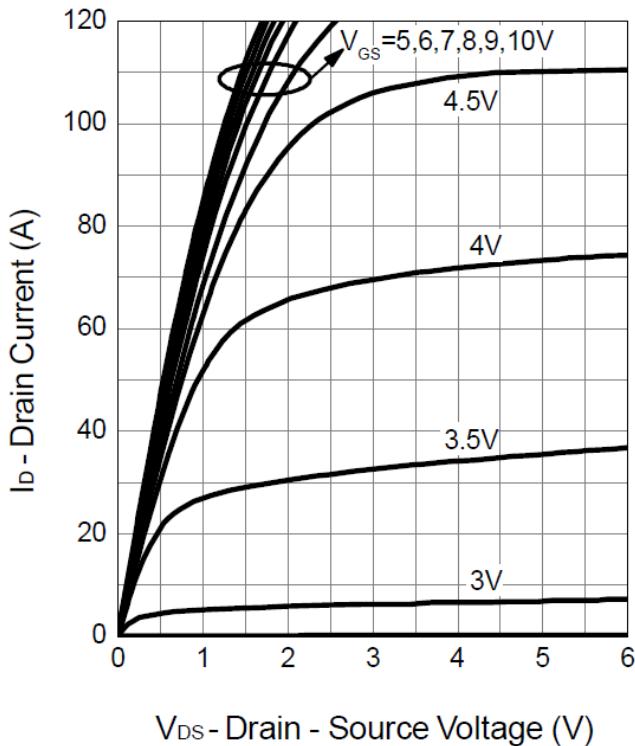
Drain-Source On Resistance
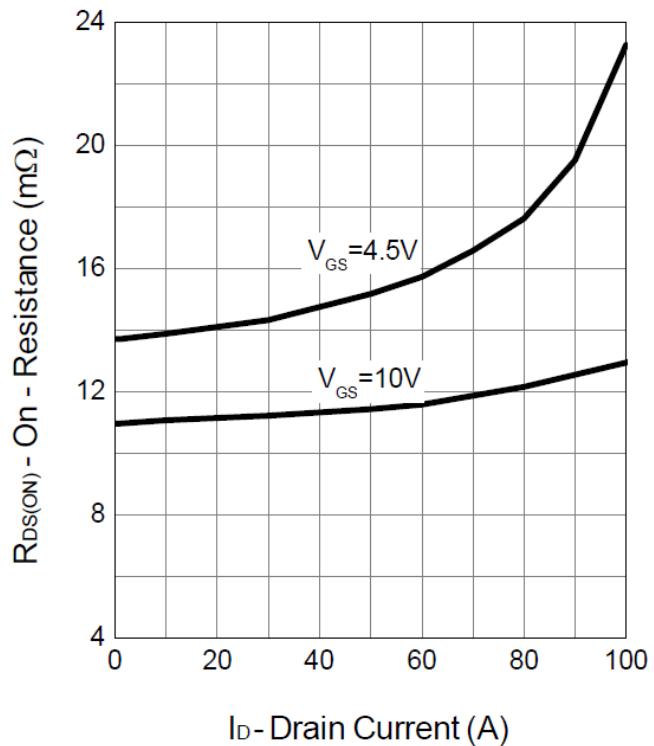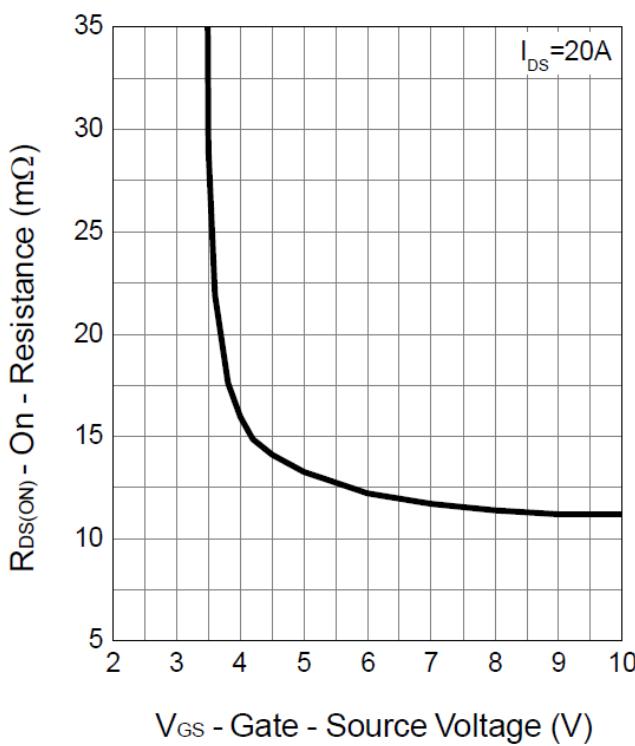

Gate-Source On Resistance

Gate Threshold Voltage
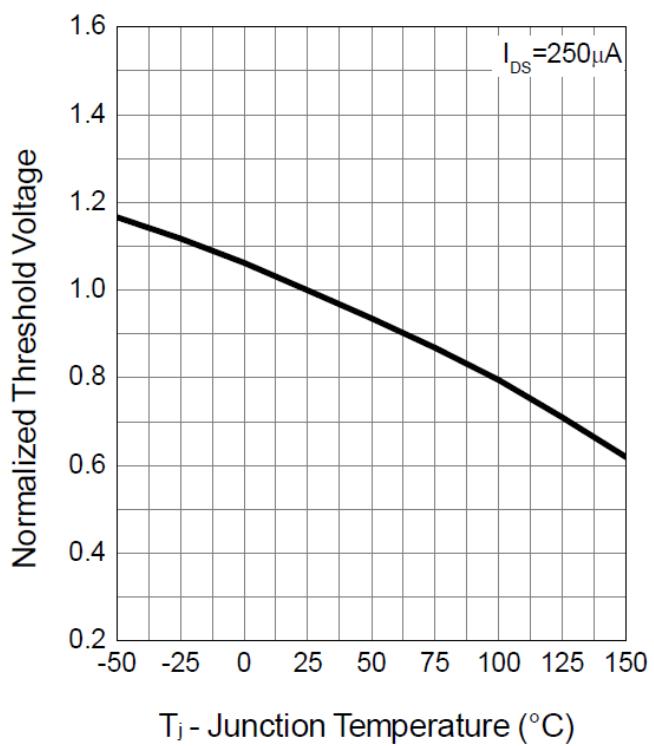
Typical Operating Characteristics (Cont.)

Drain-Source On Resistance

V_{GS} = 10V
I_{DS} = 20A

$R_{ON}@T_j$=25°C: 11.2mΩ

T_j - Junction Temperature (°C)
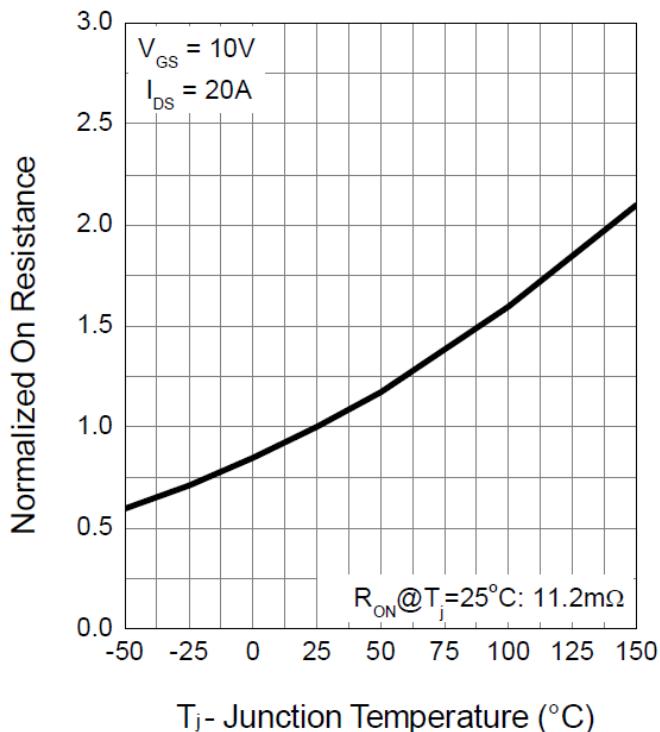
Source-Drain Diode Forward

T_j=150°C

T_j=25°C

V_{SD} - Source - Drain Voltage (V)

Capacitance

Frequency=1MHz

Ciss

Coss

Crss

V_{DS} - Drain-Source Voltage (V)

Gate Charge

V_{DS}= 50V
I_{DS}= 20A
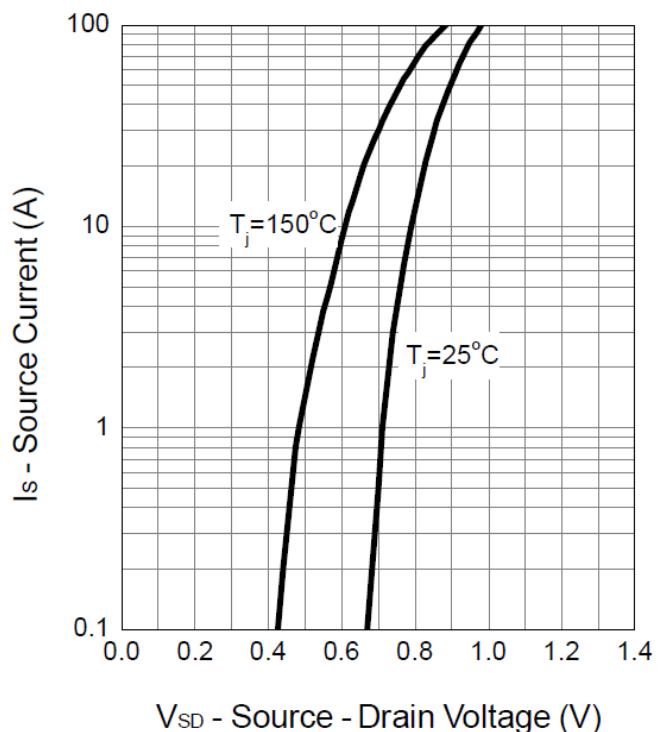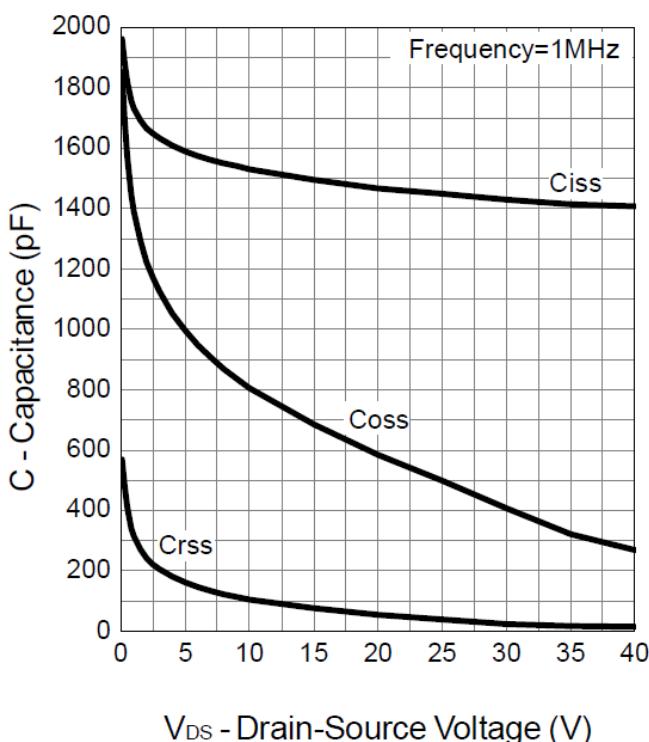
Q_G - Gate Charge (nC)
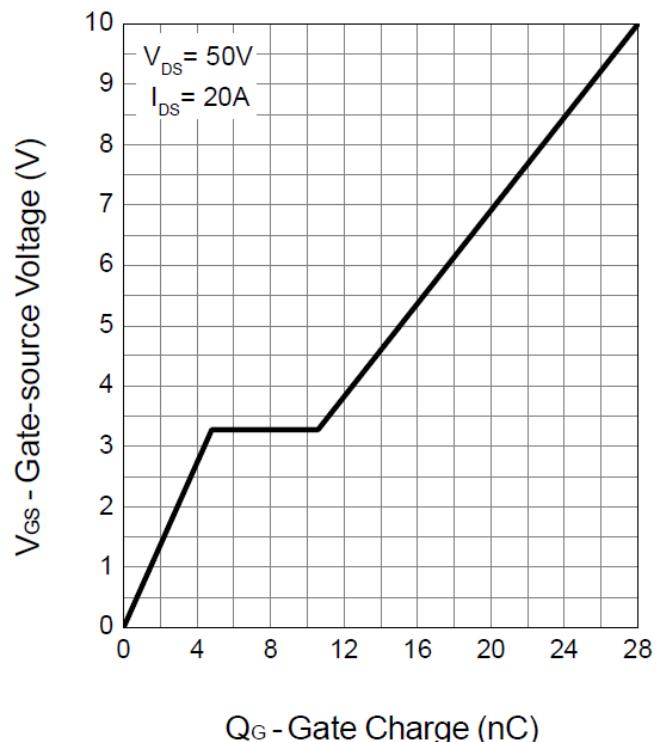
Package Information

TO220   Package
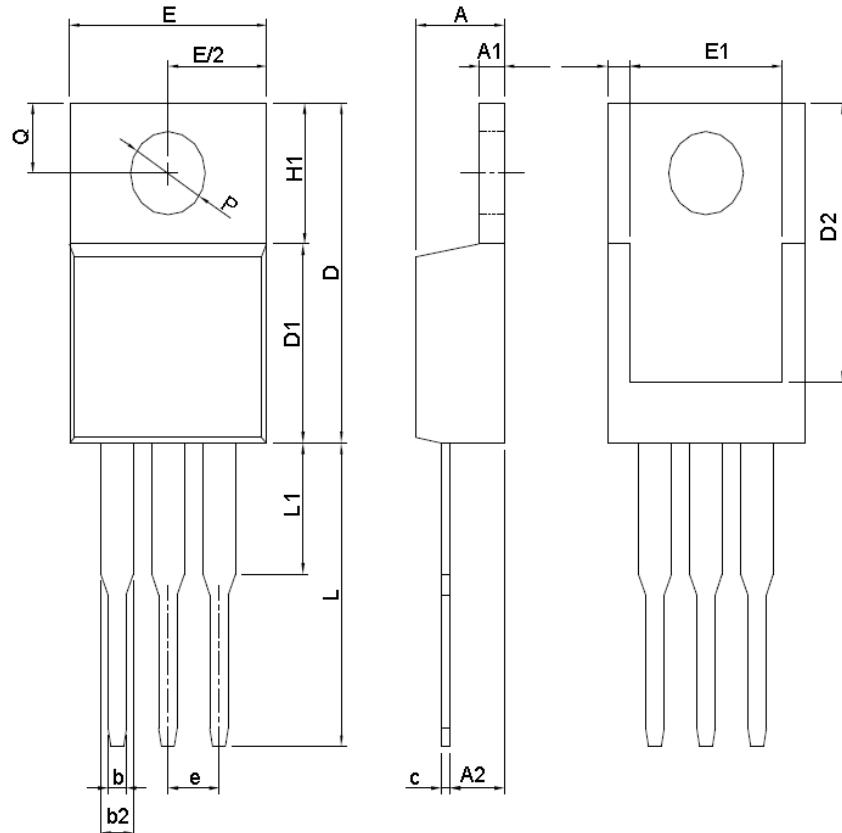
SYMBOL	TO-220			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	3.56	4.83	0.140	0.190
A1	0.51	1.40	0.020	0.055
A2	2.03	2.92	0.080	0.115
b	0.38	1.02	0.015	0.040
b2	1.14	1.78	0.045	0.070
c	0.36	0.61	0.014	0.024
D	14.22	16.51	0.560	0.650
D1	8.38	9.30	0.330	0.366
D2	12.19	13.65	0.480	0.537
E	9.65	10.67	0.380	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

2.54

R0.52
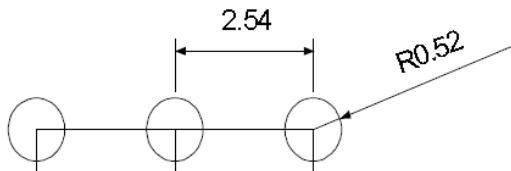
UNIT: mm

Design Notes

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