TMD3N50AZ(G)/TMU3N50AZ(G)

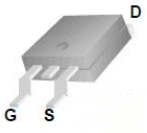
N-channel MOSFET

BV_{DSS}	I_D	$R_{DS(on)}$
500V	2.5A	< 2.8Ω

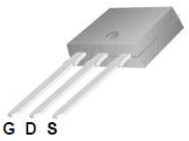
Features

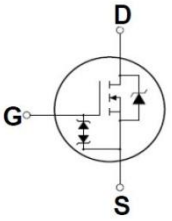
- Low gate charge
- 100% avalanche tested
- Improved dv/dt capability
- RoHS compliant
- Halogen free package
- JEDEC Qualification
- Improved ESD performance

D-PAK



I-PAK





Device	Package	Marking	Remark
TMD3N50AZ / TMU3N50AZ	D-PAK/I-PAK	TMD3N50AZ / TMU3N50AZ	RoHS
TMD3N50AZG / TMU3N50AZG	D-PAK/I-PAK	TMD3N50AZG / TMU3N50AZG	Halogen Free

Absolute Maximum Ratings

Parameter		Symbol	TMD3N50AZ(G)/TMU3N50AZ(G)	Unit
Drain-Source Voltage		V_{DSS}	500	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current	T_C = 25 ℃	I_D	2.5	A
	T_C = 100 ℃		1.71	A
Pulsed Drain Current (Note 1)		I_{DM}	10	A
Single Pulse Avalanche Energy (Note 2)		E_{AS}	84	mJ
Repetitive Avalanche Current (Note 1)		I_{AR}	2.5	A
Repetitive Avalanche Energy (Note 1)		E_{AR}	5.2	mJ
Power Dissipation	T_C = 25 ℃	P_D	52.1	W
	Derate above 25 ℃		0.416	W/℃
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5	V/ns
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55~150	℃
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		T_L	300	℃

* Limited only by maximum junction temperature

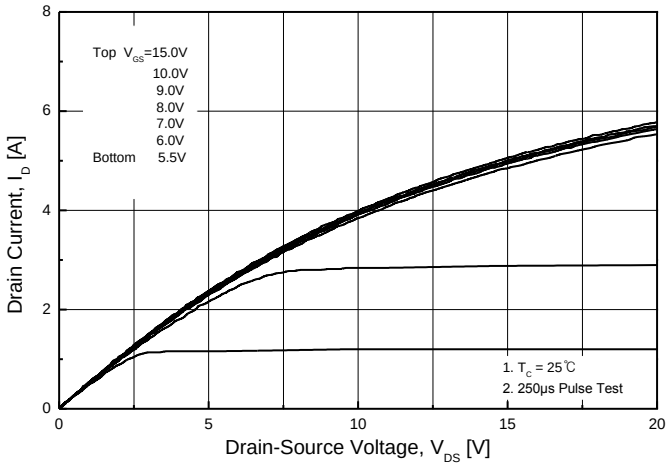
Thermal Characteristics

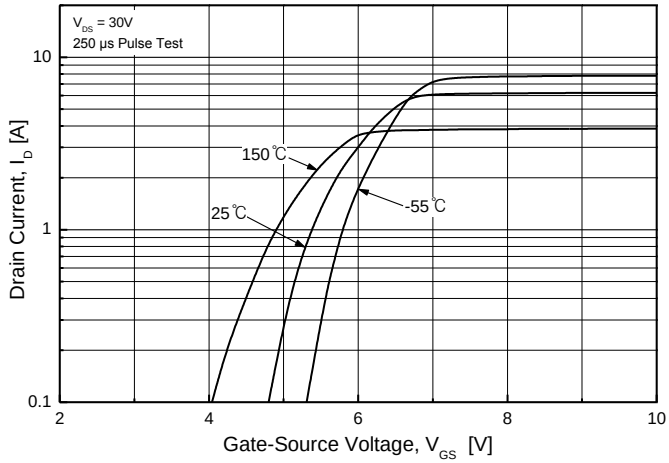
Parameter	Symbol	TMD3N50AZ(G)/TMU3N50AZ(G)	Unit
Maximum Thermal resistance, Junction-to-Case	$R_{\theta JC}$	2.4	℃/W
Maximum Thermal resistance, Junction-to-Ambient	$R_{\theta JA}$	110	℃/W

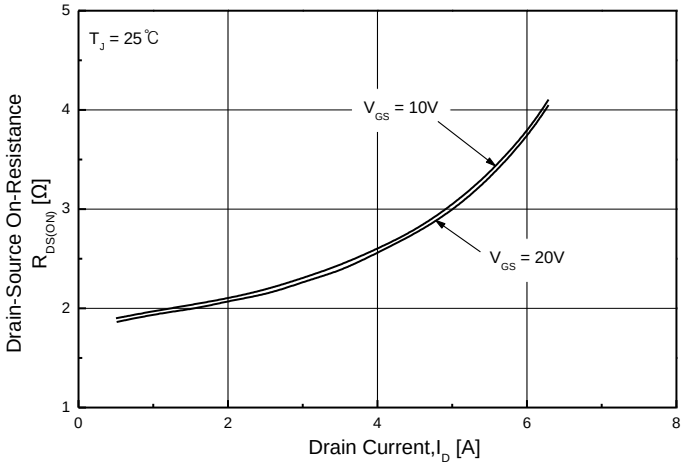
Electrical Characteristics : T_C=25℃, unless otherwise noted

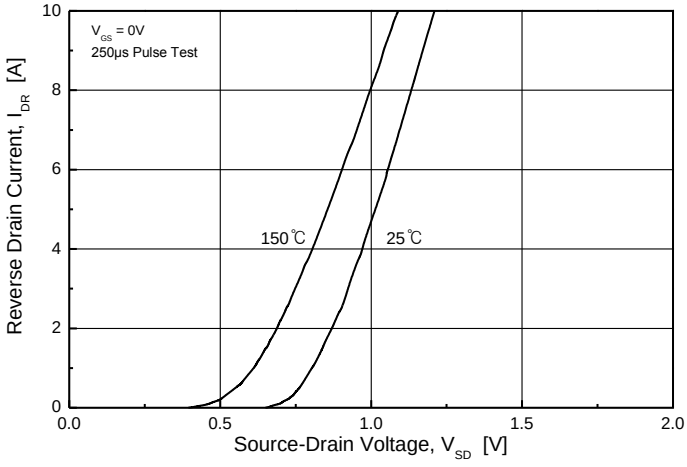
Parameter	Symbol	Test condition	Min	Typ	Max	Units
OFF						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0 V, I_D = 250 μA	500	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 500 V, V_{GS} = 0 V	--	--	1	μA
		V_{DS} = 400 V, T_C = 125°C	--	--	10	μA
Forward Gate-Source Leakage Current	I_{GSSF}	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	μA
Reverse Gate-Source Leakage Current	I_{GSSR}	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	μA
ON						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	3	--	5	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 1.25 A	--	2.3	2.8	Ω
Forward Transconductance (Note 4)	g_{FS}	V_{DS} = 30 V, I_D = 1.25 A	--	4	--	S
DYNAMIC						
Input Capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	352	--	pF
Output Capacitance	C_{oss}		--	46	--	pF
Reverse Transfer Capacitance	C_{rss}		--	8	--	pF
SWITCHING						
Turn-On Delay Time (Note 4,5)	$t_{d(on)}$	V_{DD} = 250 V, I_D = 2.5 A, R_G = 25 Ω	--	17	--	ns
Turn-On Rise Time (Note 4,5)	t_r		--	24	--	ns
Turn-Off Delay Time (Note 4,5)	$t_{d(off)}$		--	42	--	ns
Turn-Off Fall Time (Note 4,5)	t_f		--	19	--	ns
Total Gate Charge (Note 4,5)	Q_g	V_{DS} = 400 V, I_D = 2.5 A, V_{GS} = 10 V	--	8	--	nC
Gate-Source Charge (Note 4,5)	Q_{gs}		--	2	--	nC
Gate-Drain Charge (Note 4,5)	Q_{gd}		--	4	--	nC
SOURCE DRAIN DIODE						
Maximum Continuous Drain-Source Diode Forward Current	I_S	----	--	--	2.5	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}	----	--	--	10	A
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS} = 0 V, I_S = 2.5 A	--	--	1.5	V
Reverse Recovery Time (Note 4)	t_{rr}	V_{GS} = 0 V, I_S = 2.5 A, dI_F / dt = 100 A/μs	--	223	--	ns
Reverse Recovery Charge (Note 4)	Q_{rr}		--	0.8	--	μC

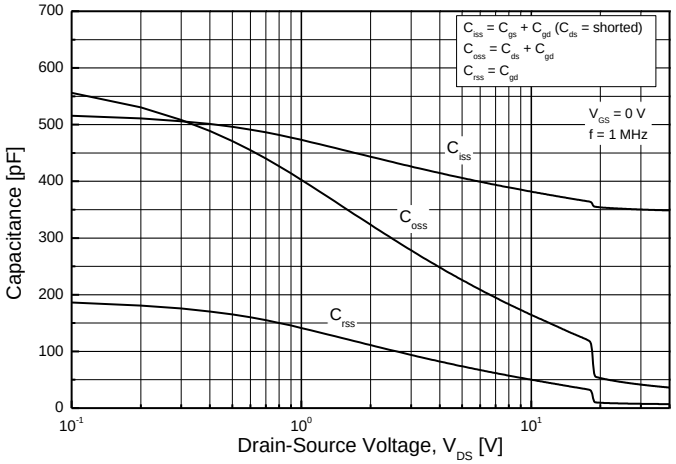
Note :
1. Repeated rating : Pulse width limited by safe operating area
2. L=24.3mH, I_{AS} = 2.5A, V_{DD} = 50V, R_G = 25Ω, Starting T_J= 25 ℃
3 I_{SD} ≤ 2.5A, di/dt ≤ 200A/μs , V_{DD} ≤ BV_{DS}, Starting T_J= 25 ℃
4. Pulse Test :Pulse width ≤ 300μs, Duty Cycle ≤ 2%
5. Essentially Independent of Operating Temperature Typical Characteristics

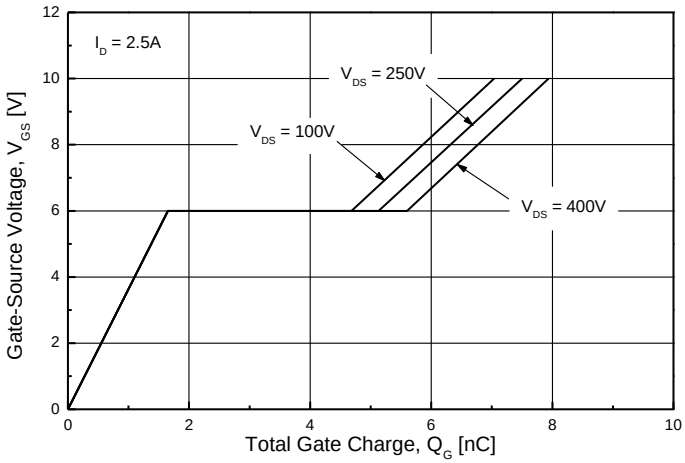

Top V_GS=15.0V
10.0V
9.0V
8.0V
7.0V
6.0V
Bottom 5.5V
1. T_C = 25℃
2. 250μs Pulse Test
Drain Current, I_D [A]
Drain-Source Voltage, V_DS [V]

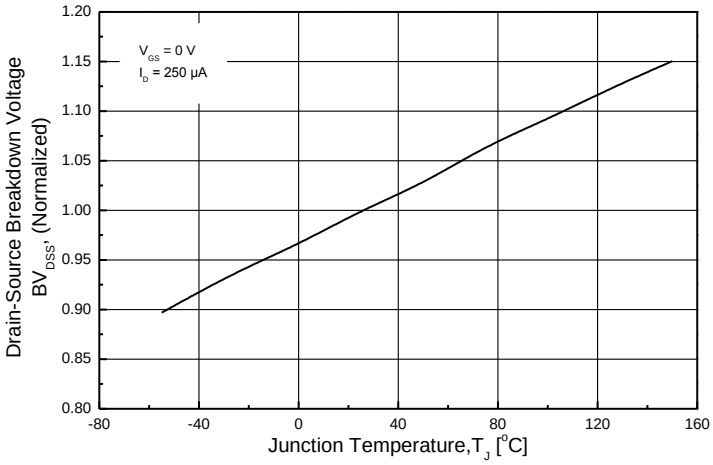

V_DS = 30V
250 μs Pulse Test
150℃
25℃
-55℃
Drain Current, I_D [A]
Gate-Source Voltage, V_GS [V]

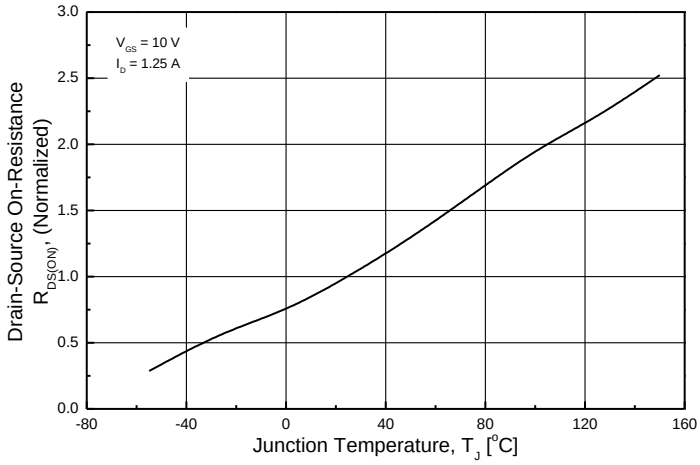

T_J = 25℃
V_GS = 10V
V_GS = 20V
Drain-Source On-Resistance
R_DS(ON) [Ω]
Drain Current,I_D [A]

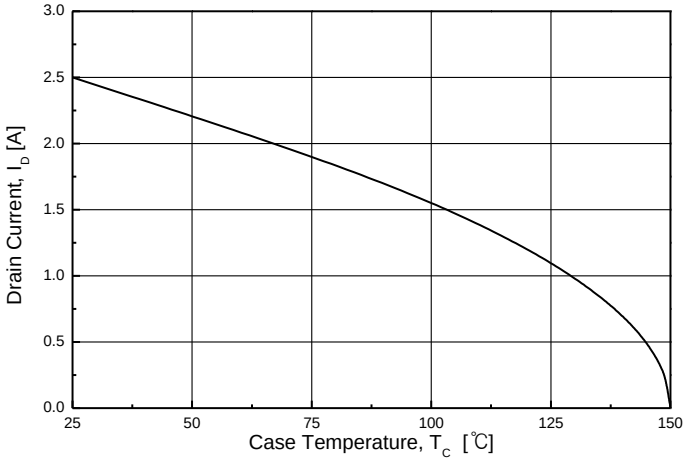

V_GS = 0V
250μs Pulse Test
150℃
25℃
Reverse Drain Current, I_DR [A]
Source-Drain Voltage, V_SD [V]

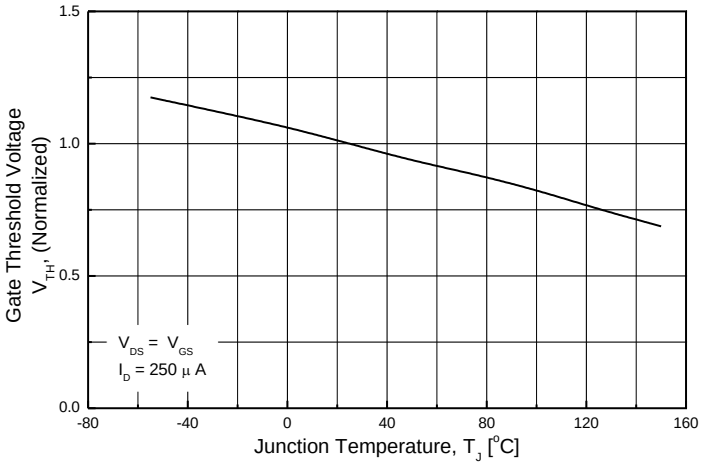

C_iss = C_gs + C_gd (C_ds = shorted)
C_oss = C_ds + C_gd
C_rss = C_gd
V_GS = 0 V
f = 1 MHz
C_iss
C_oss
C_rss
Capacitance [pF]
Drain-Source Voltage, V_DS [V]

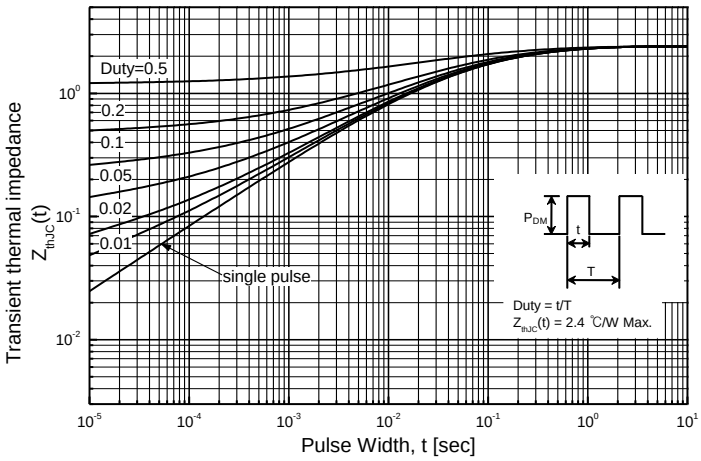

I_D = 2.5A
V_DS = 250V
V_DS = 100V
V_DS = 400V
Gate-Source Voltage, V_GS [V]
Total Gate Charge, Q_G [nC]

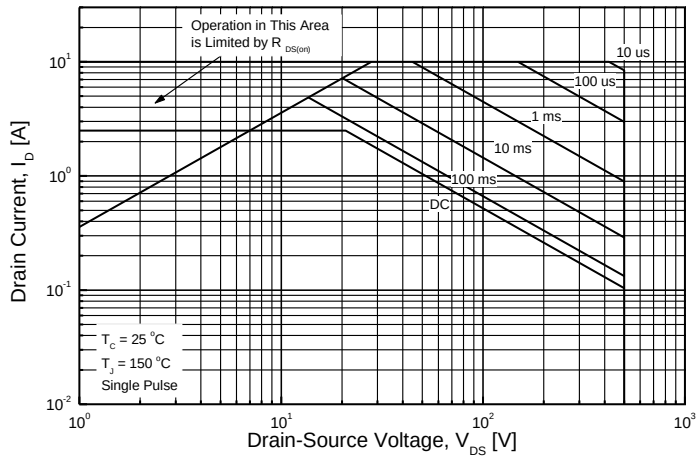

Drain-Source Breakdown Voltage
BVDSS, (Normalized)
VGS = 0 V
ID = 250 μA
Junction Temperature,TJ [°C]


Drain-Source On-Resistance
RDS(ON), (Normalized)
VGS = 10 V
ID = 1.25 A
Junction Temperature, TJ [°C]

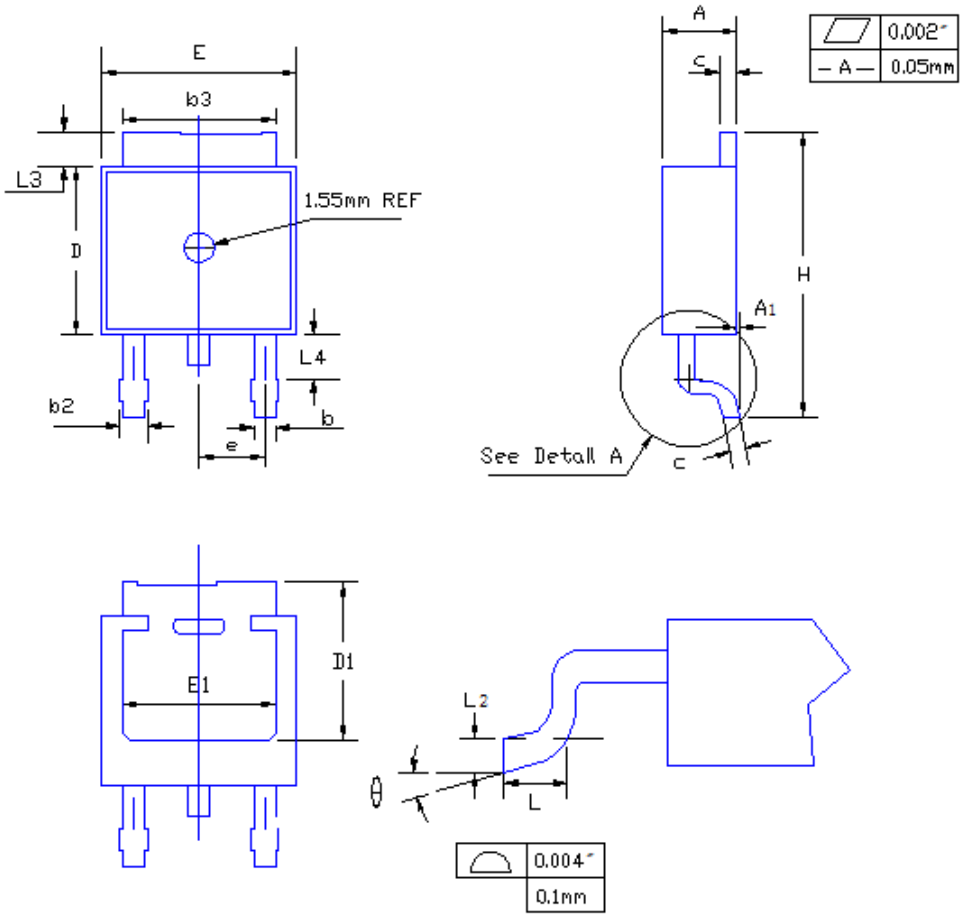

Drain Current, ID [A]
Case Temperature, TC [℃]


Gate Threshold Voltage
VTH, (Normalized)
VDS = VGS
ID = 250 μ A
Junction Temperature, TJ [°C]


Transient thermal impedance
ZthJC(t)
Duty=0.5
0.2
0.1
0.05
0.02
0.01
single pulse
PDM
t
T
Duty = t/T
ZthJC(t) = 2.4 ℃/W Max.
Pulse Width, t [sec]

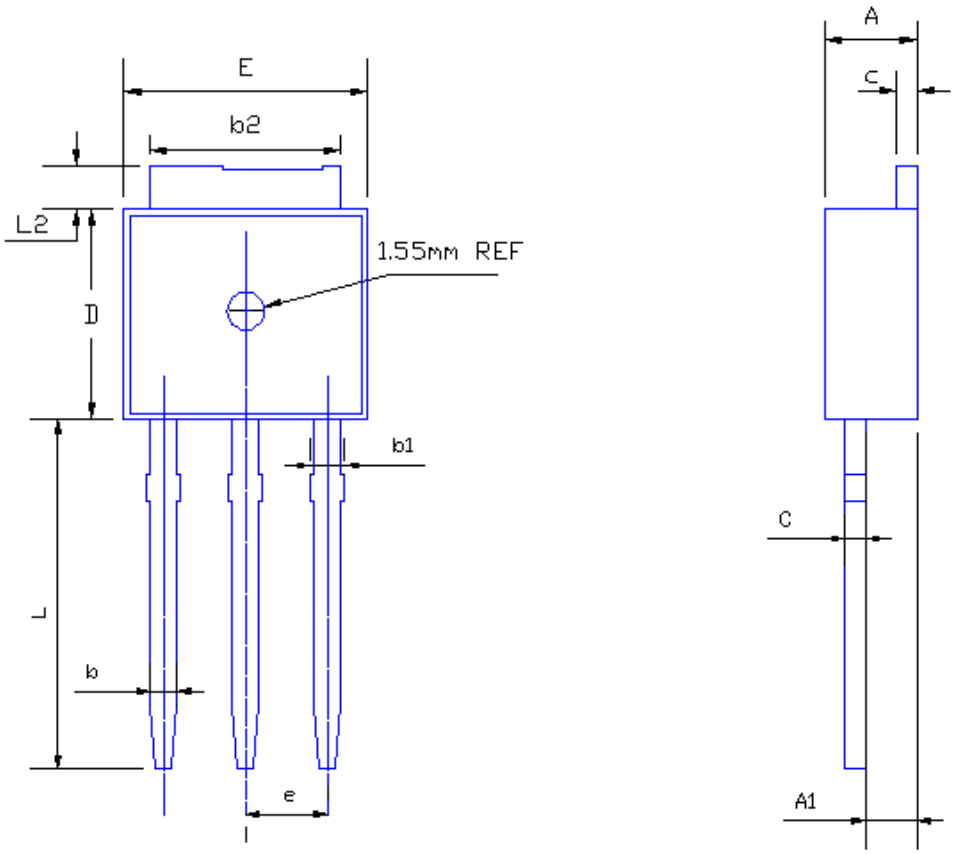

Operation in This Area
is Limited by RDS(on)
10 us
100 us
1 ms
10 ms
100 ms
DC
Drain Current, ID [A]
TC = 25 °C
TJ = 150 °C
Single Pulse
Drain-Source Voltage, VDS [V]

TO-252 (D-PAK) MECHANICAL DATA



SYMBOL	MILLIMETERS	
	MIN	MAX
A	2.19	2.38
A1	–	0.13
b	0.64	0.89
b2	0.84	1.14
b3	5.21	5.46
c	0.46	0.61
D	5.97	6.22
D1	5.21	—
E	6.35	6.73
E1	4.83	—
e	2.29BSC	
H	9.65	10.41
L	1.40	1.78
L2	0.51BSC	
L3	0.89	1.27
L4	0.64	1.01
θ	0	8

TO-251 (I-PAK) MECHANICAL DATA



SYMBOL	MILLIMETERS	
	MIN	MAX
A	2.19	2.38
A1	1.04	1.23
b	0.64	0.89
b1	0.84	1.14
b2	5.23	5.48
c	0.46	0.61
D	5.91	6.28
E	6.21	6.59
e	2.28 TYP	
L	8.89	9.65
L2	0.89	1.27