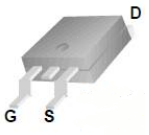
Features

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

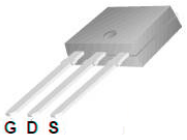
N-channel MOSFET

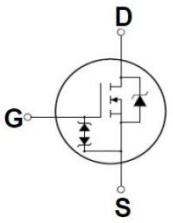
BV_{DSS}	I_D	$R_{DS(on)}$
500V	2.5A	<2.8W

D-PAK



I-PAK





Device	Package	Marking	Remark
TMD3N50Z / TMU3N50Z	D-PAK/I-PAK	TMD3N50Z / TMU3N50Z	RoHS
TMD3N50ZG / TMU3N50ZG	D-PAK/I-PAK	TMD3N50ZG / TMU3N50ZG	Halogen Free

Absolute Maximum Ratings

Parameter		Symbol	TMD3N50Z(G)/TMU3N50Z(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		1.8	A
Pulsed Drain Current (Note 1)		I_{DM}	10	A
Single Pulse Avalanche Energy (Note 2)		E_{AS}	107	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	W
	Derate above 25		0.41	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,		T_L	300	

* Limited only by maximum junction temperature

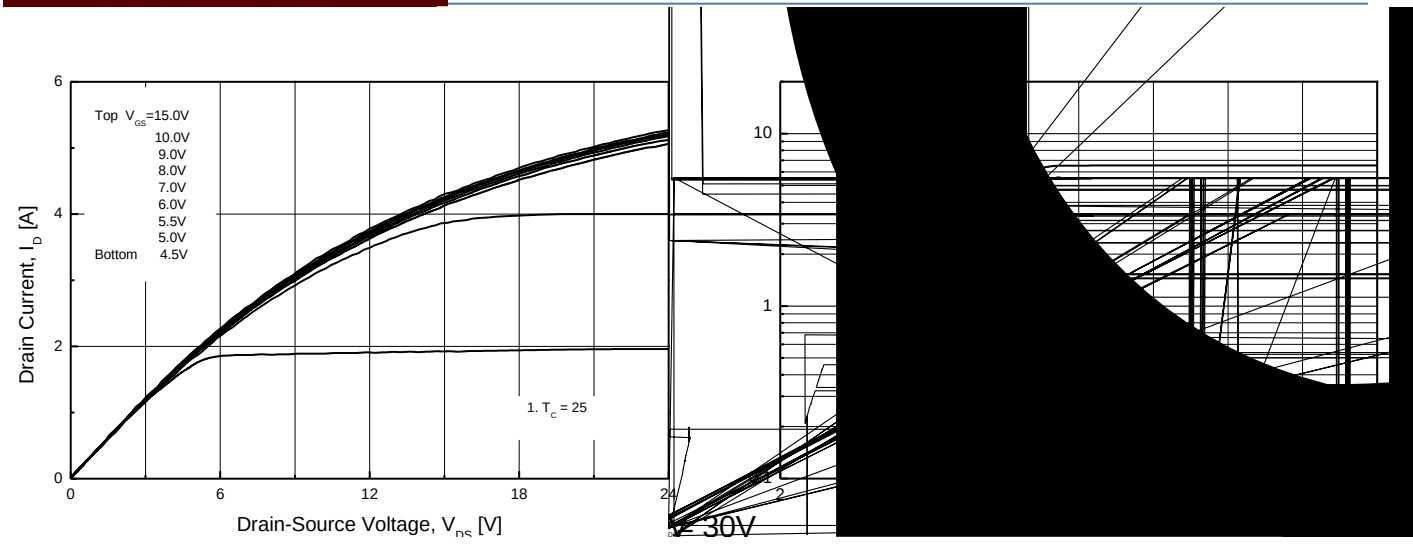
Thermal Characteristics

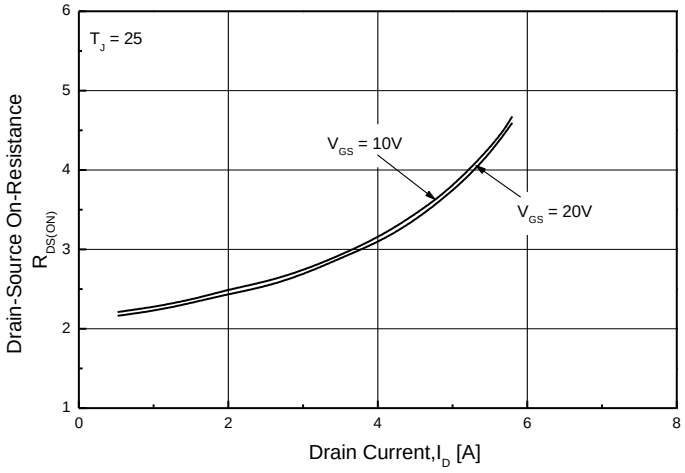
Parameter	Symbol	TMD3N50Z(G)/TMU3N50Z(G)	Unit
Maximum Thermal resistance, Junction-to-Case	R_{qJC}	2.4	/W
Maximum Thermal resistance, Junction-to-Ambient	R_{qJA}	110	/W

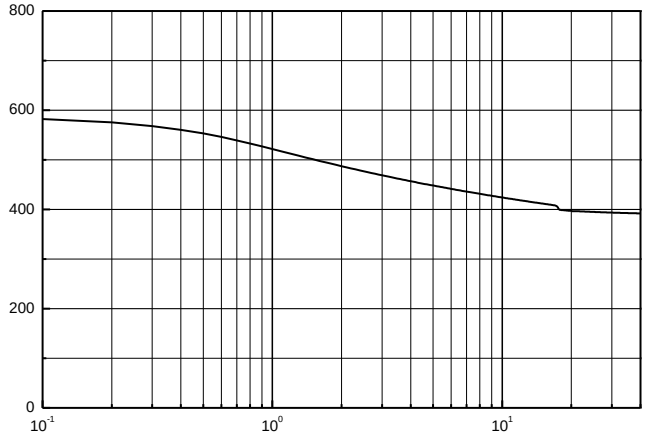
Electrical Characteristics : T_C=25 , unless otherwise noted

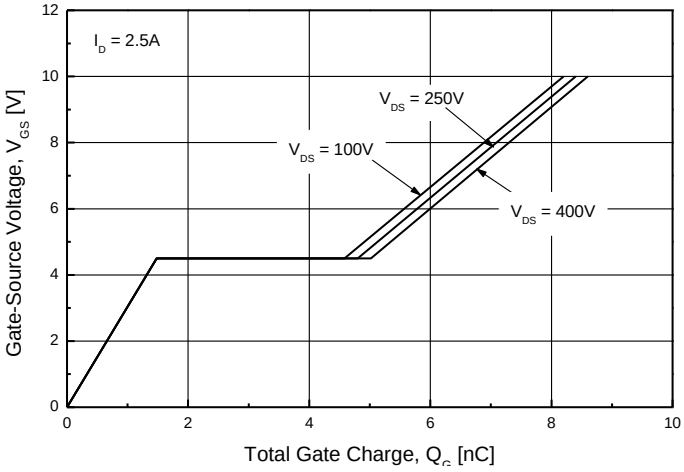
Parameter	Symbol	Test condition	Min	Typ	Max	Units
OFF						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0 V, I_D = 250 µA	500	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 500 V, V_{GS} = 0 V	--	--	1	µA
		V_{DS} = 400 V, T_C = 125°C	--	--	10	µA
Forward Gate-Source Leakage Current	I_{GSSF}	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	2	--	4	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 1.25 A	--	2.3	2.8	W
Forward Transconductance (Note 4)	g_{FS}	V_{DS} = 30 V, I_D = 1.25 A	--	5	--	S
DYNAMIC						
Input Capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	395	--	pF
Output Capacitance	C_{oss}		--	44	--	pF
Reverse Transfer Capacitance	C_{rss}		--	7.8	--	pF
SWITCHING						
Turn-On Delay Time (Note 4,5)	$t_{d(on)}$	V_{DD} = 250 V, I_D = 2.5 A, R_G	--	16	--	ns
Turn-On Rise Time (Note 4,5)	t_r					

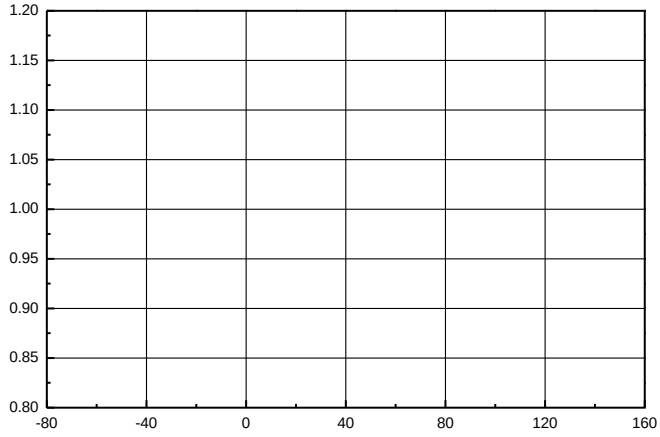
Note :
1. Repeated rating : Pulse width limited by safe operating area
2. L=30.9mH, I_{AS} = 2.5A, V_{DD} = 50V, R_G = 25 , Starting T_J= 25
3 I_{SD} , di/dt µs , V_{DD} $_{DS}$, Starting T_J= 25
µ
5. Essentially Independent of Operating Temperature Typical Characteristics

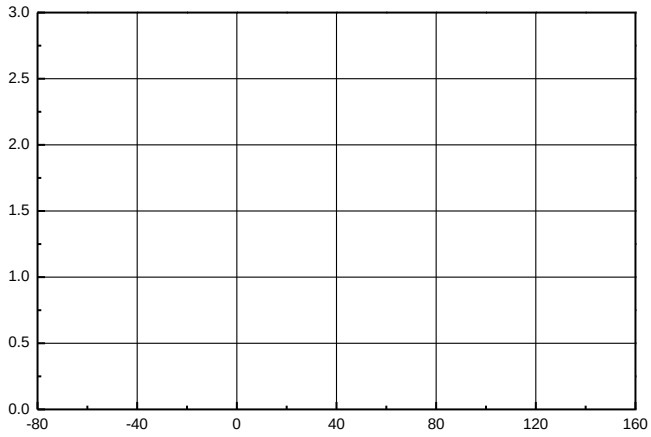

Top V_GS=15.0V
10.0V
9.0V
8.0V
7.0V
6.0V
5.5V
5.0V
Bottom 4.5V
1. T_C = 25
Drain Current, I_D [A]
Drain-Source Voltage, V_DS [V]
V = 30V

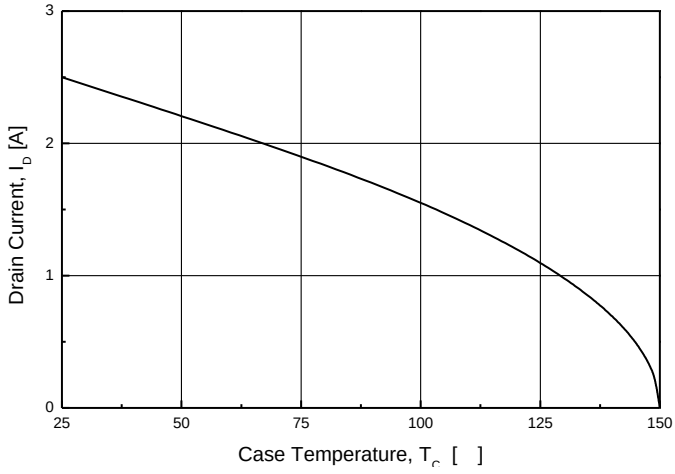

T_J = 25
V_GS = 10V
V_GS = 20V
Drain-Source On-Resistance
R_DS(ON)
Drain Current,I_D [A]

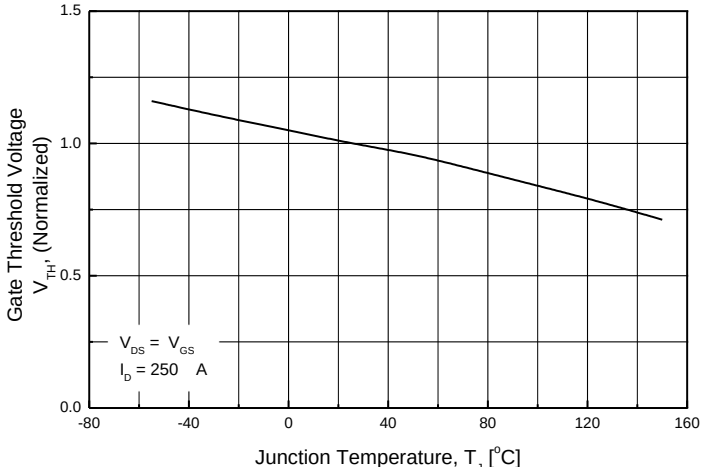


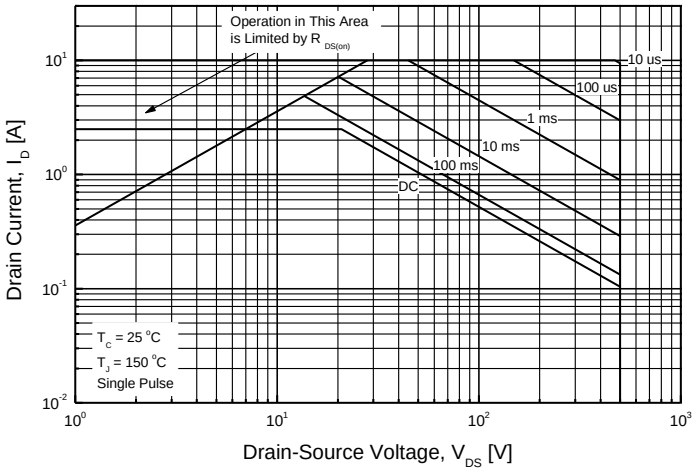

I_D = 2.5A
V_DS = 250V
V_DS = 100V
V_DS = 400V
Gate-Source Voltage, V_GS [V]
Total Gate Charge, Q_G [nC]

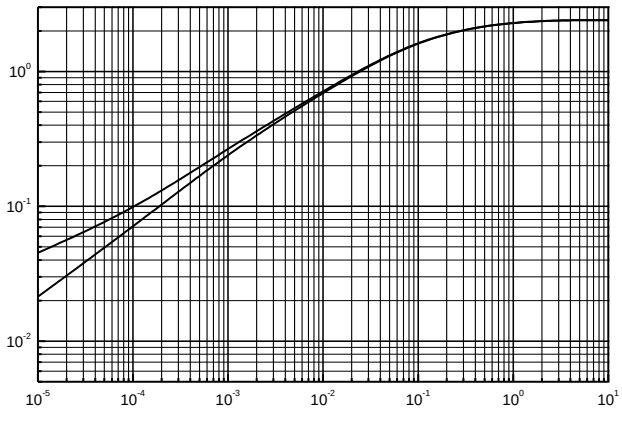

1.20
1.15
1.10
1.05
1.00
0.95
0.90
0.85
0.80
-80
-40
0
40
80
120
160


3.0
2.5
2.0
1.5
1.0
0.5
0.0
-80
-40
0
40
80
120
160

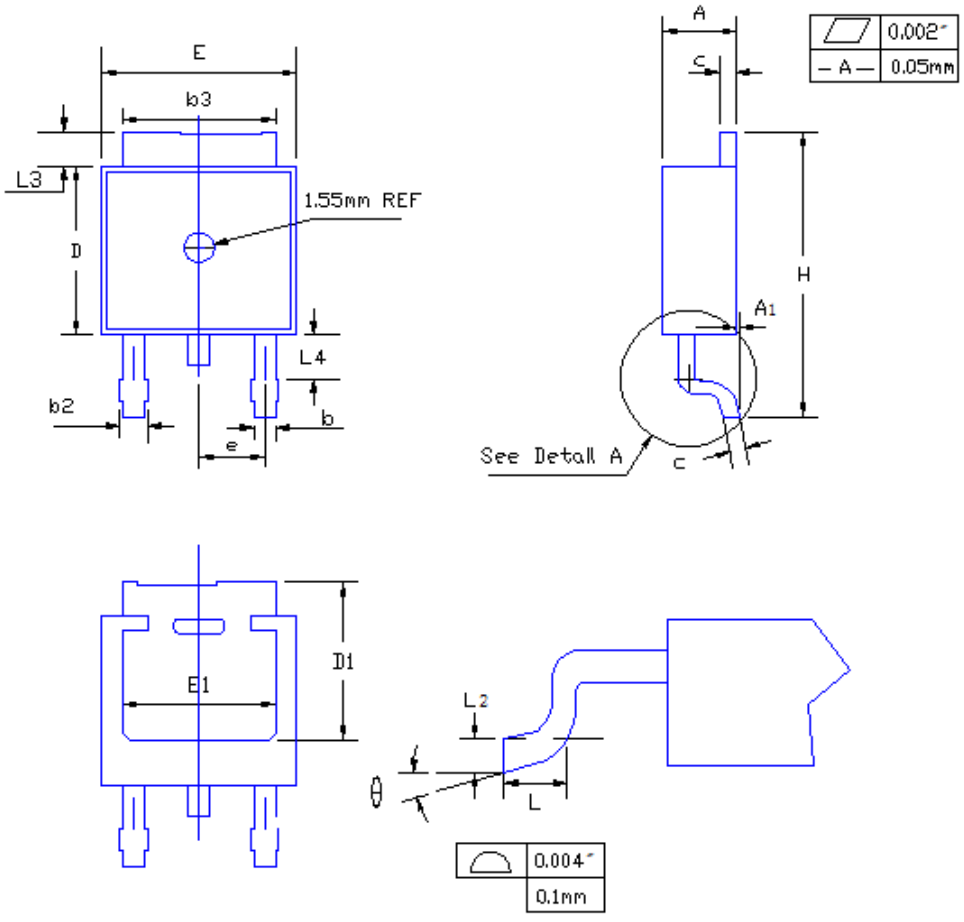

Drain Current, I_D [A]
3
2
1
0
25
50
75
100
125
150
Case Temperature, T_C [ ]


Gate Threshold Voltage
V_TH, (Normalized)
1.5
1.0
0.5
0.0
V_DS = V_GS
I_D = 250 A
-80
-40
0
40
80
120
160
Junction Temperature, T_J [°C]


Operation in This Area
is Limited by R DS(on)
10 us
100 us
1 ms
10 ms
100 ms
DC
T_C = 25 °C
T_J = 150 °C
Single Pulse
Drain Current, I_D [A]
10^1
10^0
10^-1
10^-2
10^0
10^1
10^2
10^3
Drain-Source Voltage, V_DS [V]

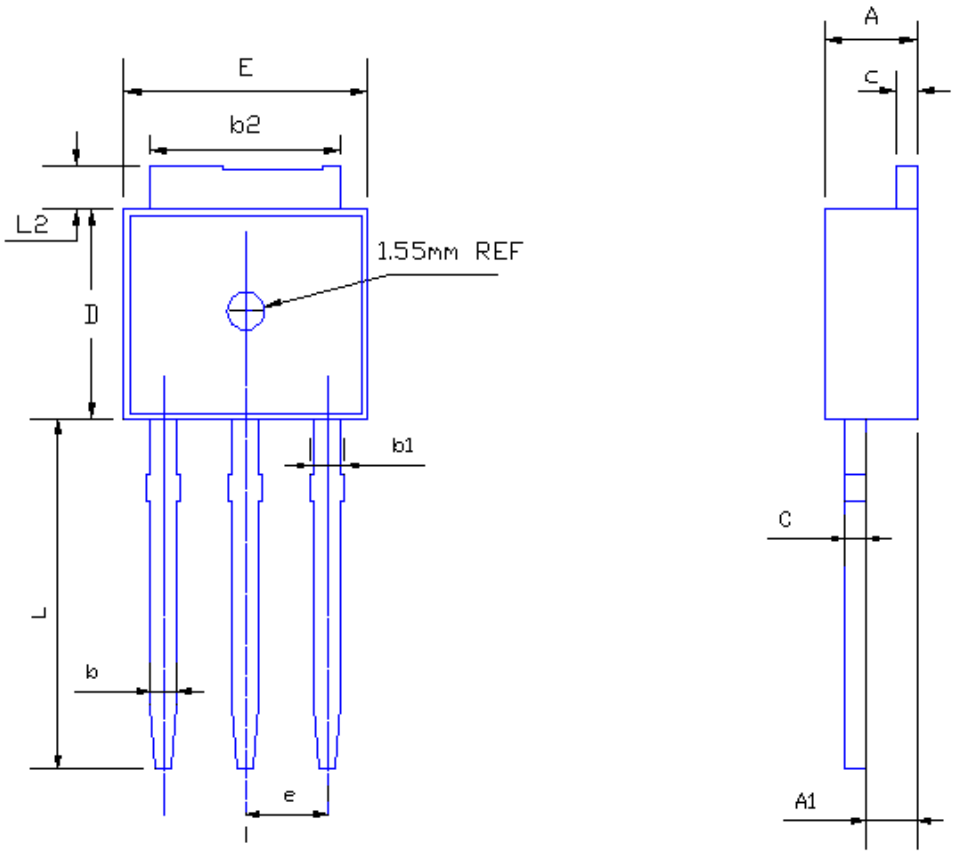

10^0
10^-1
10^-2
10^-5
10^-4
10^-3
10^-2
10^-1
10^0
10^1

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