

MOSFET

320A,150V,4mΩ, N-CHANNEL MOSFET

Features

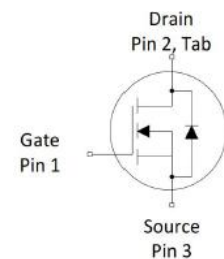
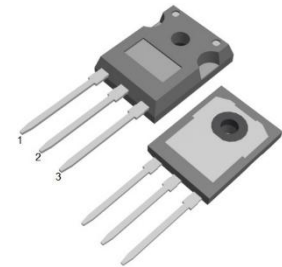
- ◆ Low gate charge
- ◆ Low Ciss
- ◆ Fast switching
- ◆ 100% avalanche tested

Applications

- ◆ Networking
- ◆ Load Switch
- ◆ LED applications
- ◆ Quick Charge

Parameter	Values	Unit
BV_{DSS}	150	V
I_D	320	A
$R_{Dson(max)}$	4	mΩ
$V_{GS(th)}(Typ)$	3	V

View and Internal
Schematic Diagram
TO-247-3L



Ordering Code	Marking	Package	Packaging
X4N15GHA3	X4N15GHA3	TO-247-3L	Tube

Absolute Maximum Ratings($T_C=25^{\circ}C$, unless otherwise noted)

Parameter	Symbol	Values			Unit	Note/Test Conditions
		Min	Typ	Max		
Drain-Source Voltage	V_{DSS}	-	-	150	V	-
Gate-Source Voltage	V_{GS}	-20	-	20	V	-
Continuous Drain Current(Note 1)	I_D	-	-	320	A	$T_C=25^{\circ}C$
		-	-	203	A	$T_C=100^{\circ}C$
Pulsed Drain Current(Note 2)	I_{DM}	-	-	1280	A	-
Single Pulse Avalanche Energy	E_{AS}	-	-	2047	mJ	$L=0.5mH, V_D=50V, T_C=25^{\circ}C$
Maximum Power Dissipation	P_D	-	-	694	W	$T_C=25^{\circ}C$
		-	-	3.7	W	$T_A=25^{\circ}C$
Operating Junction and Storage Temperature Range	T_{j}, T_{STG}	-50	-	150	$^{\circ}C$	-

Thermal Characteristics

Parameter	Symbol	Values			Unit	Note/Test Conditions
		Min	Typ	Max		
Thermal resistance , Junction to Case	$R_{th(j-c)}$	-	0.18	-	$^{\circ}C/W$	-
Thermal resistance , Junction to Ambient	$R_{th(j-a)}$	-	33	-		-

Electrical Characteristics ($T_j=25^{\circ}\text{C}$, unless otherwise noted)

Static characteristics

Parameter	Symbol	Values			Unit	Note/Test Conditions
		Min	Typ	Max		
Drain-Source Breakdown Voltage	BV_{DSS}	150	-	-	V	$V_{GS}=0V, I_D=250\mu A$
Zero Gate Voltage Drain Current	I_{DSS}	-	-	1	μA	$V_{DS}=150V, V_{GS}=0V$
Gate-Body Leakage Current, Forward	I_{GSSF}	-	-	100	nA	$V_{GS}=20V, V_{DS}=0V$
Gate-Body Leakage Current, Reverse	I_{GSSR}	-	-	-100	nA	$V_{GS}=-20V, V_{DS}=0V$
Gate-Source Threshold Voltage	$V_{GS(th)}$	2	-	4	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Drain-Source On-State Resistance	$R_{DS(on)}$	-	3.6	4.0	m Ω	$V_{GS}=10V, I_D=50A$
Gate Resistance	R_g	-	3.1	-	Ω	$V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$
Forward Transconductance	g_{fs}	-	79	-	S	$V_{DS}=5V, I_D=30A$

Dynamic characteristics

Parameter	Symbol	Values			Unit	Note/Test Conditions
		Min	Typ	Max		
Input Capacitance	C_{iss}	-	11641	-	pF	$V_{DS}=75V, V_{GS}=0V, f=1.0\text{MHz}$
Output Capacitance	C_{oss}	-	921	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	73	-	pF	
Turn-On Delay Time	$t_{d(on)}$	-	28	-	ns	$V_{DD}=75V, R_g=1.6\Omega, V_{GS}=10V, I_D=50A$
Turn-On Rise Time	t_r	-	128	-	ns	
Turn-Off Delay Time	$t_{d(off)}$	-	187	-	ns	
Turn-Off Fall Time	t_f	-	120	-	ns	

Gate charge characteristics

Parameter	Symbol	Values			Unit	Note/Test Conditions
		Min	Typ	Max		
Total Gate Charge	Q_g	-	199	-	nC	$V_{DS}=75V, I_D=50A, V_{GS}=10V$
Gate-Source Charge	Q_{gs}	-	44	-	nC	
Gate-Drain Charge	Q_{gd}	-	68	-	nC	

Reverse diode

Parameter	Symbol	Values			Unit	Note/Test Conditions
		Min	Typ	Max		
Continuous Diode Forward Current	I_S	-	-	320	A	-
Pulsed Diode Forward Current	I_{SM}	-	-	1280	A	-
Diode Forward Voltage	V_{SD}	-	-	1.2	V	$I_S=50A, V_{GS}=0V$
Reverse Recovery Time	t_{rr}	-	109	-	ns	$V_{DS}=75V, V_{DS}=0V, I_S=50A$
Reverse Recovery Charge	Q_{rr}	-	310	-	nC	$di/dt=100A/\mu s$

Notes

1. Computed continuous current assumes the condition of T_{j_Max} while the actual continuous current depends on the thermal & electro-mechanical application board design.
2. This single-pulse measurement was taken under $T_{j_Max} = 150^{\circ}\text{C}$.

RATING AND CHARACTERISTIC CURVES



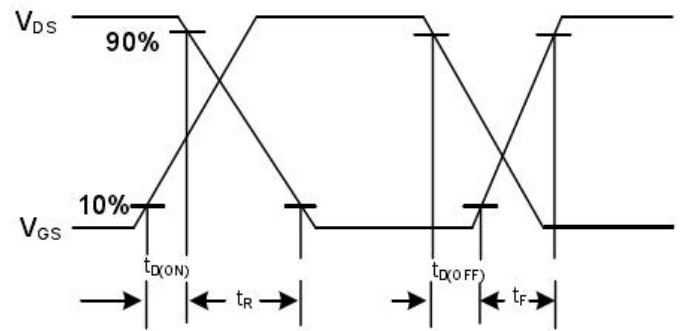
Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms



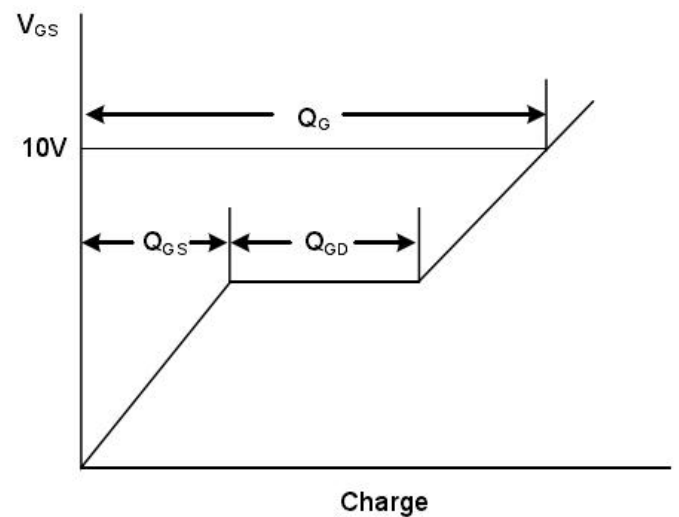
Switching Test Circuit



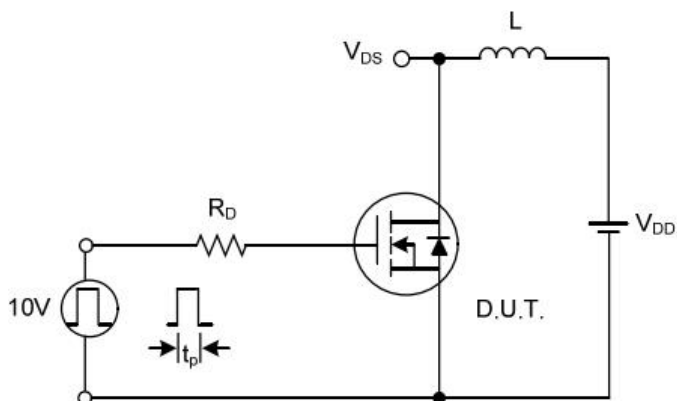
Switching Waveforms



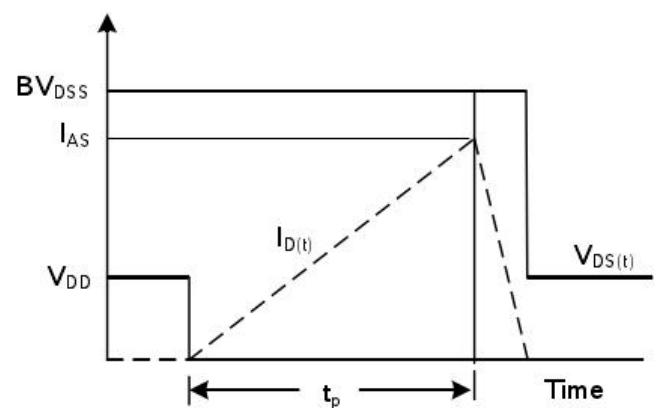
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

RATING AND CHARACTERISTIC CURVES

Figure.1 Output Characteristics $T_J=25^{\circ}\text{C}$

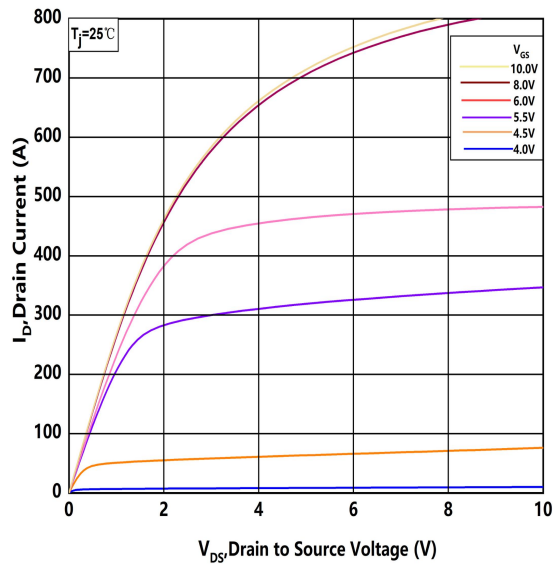


Figure.2 Transfer Characteristic for Various Junction Temperatures

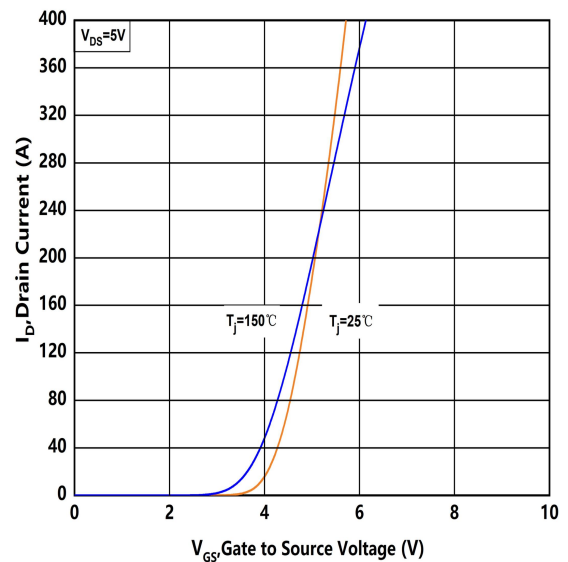


Figure.3 On-Resistance vs Drain Current For Various Gate Voltage

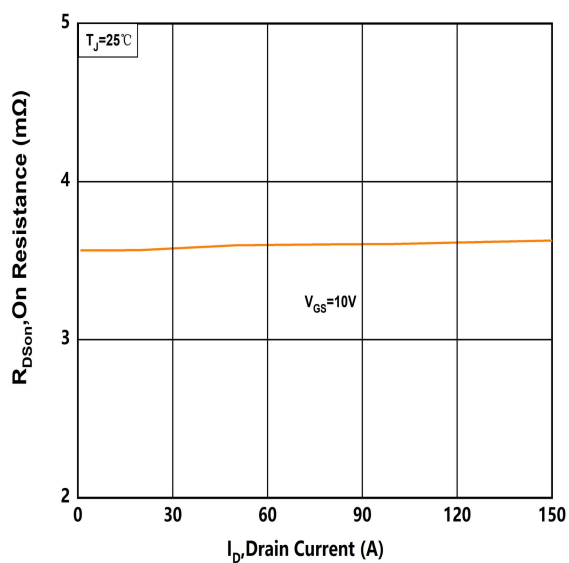


Figure.4 Typical On-Resistance vs Junction Temperature

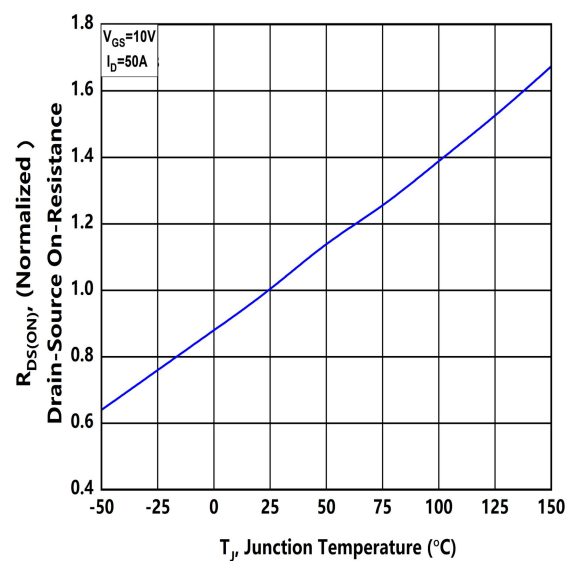


Figure.5 Typical Threshold Voltage vs Junction Temperature

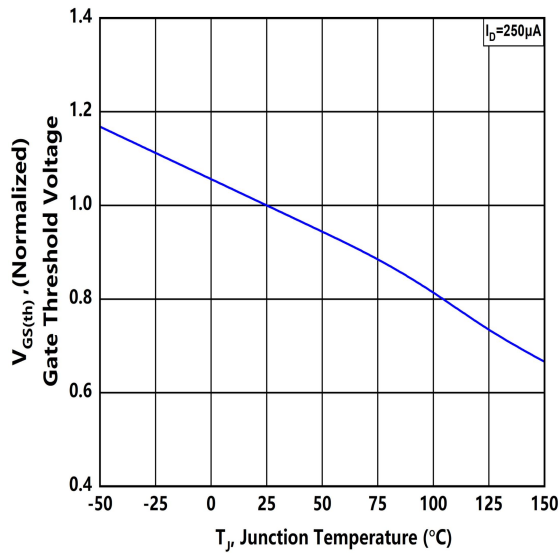


Figure.6 Typical Breakdown Voltage vs Junction Temperature

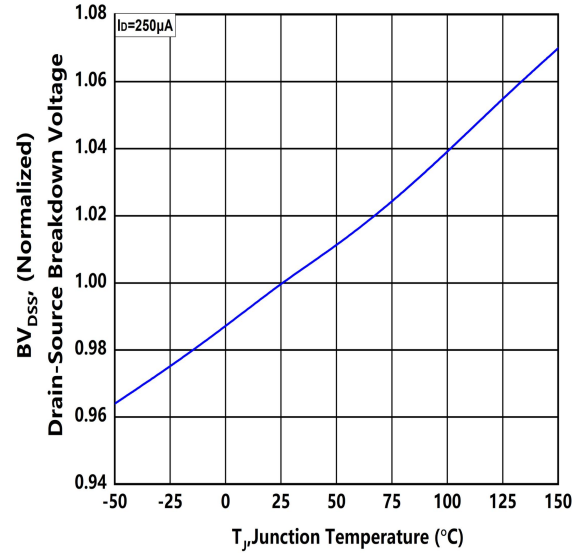


Figure.7 Typical Capacitance vs Drain to Source Voltage

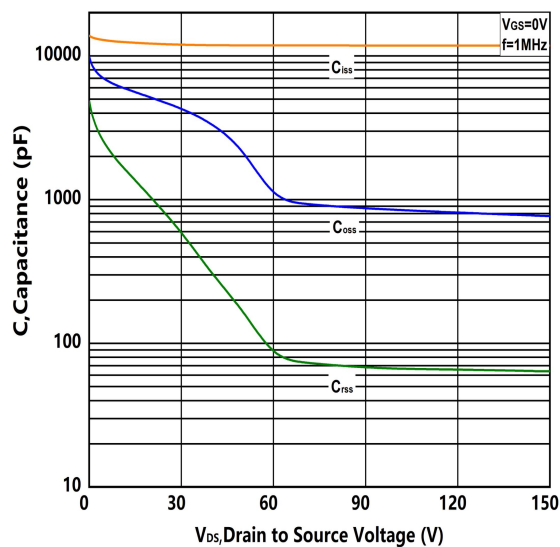


Figure.8 Typical Gate Charge vs Gate to Source Voltage

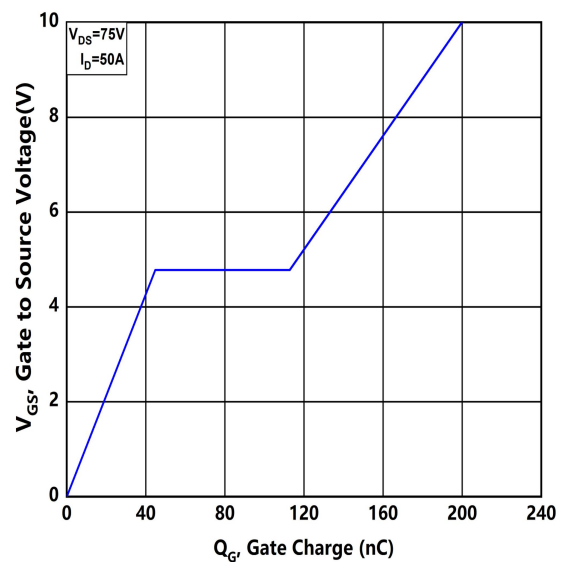


Figure.9 Typical Body Diode Characteristics

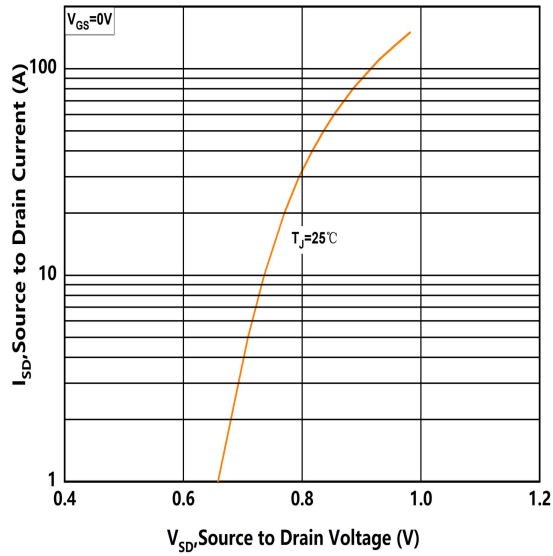


Figure.10 Maximum power Dissipation Derating vs Case Temperature

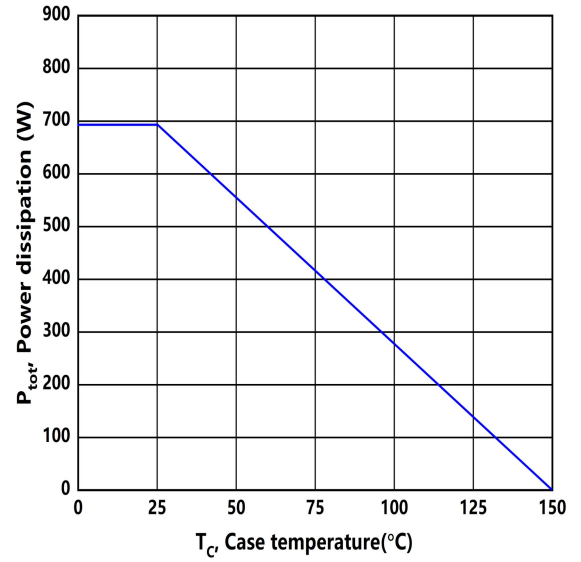


Figure.11 Continuous Drain Current Derating vs Case Temperature

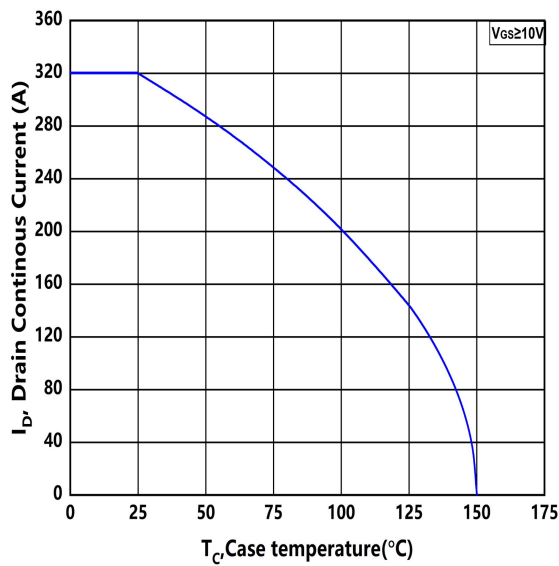


Figure.12 Safe Operating Area

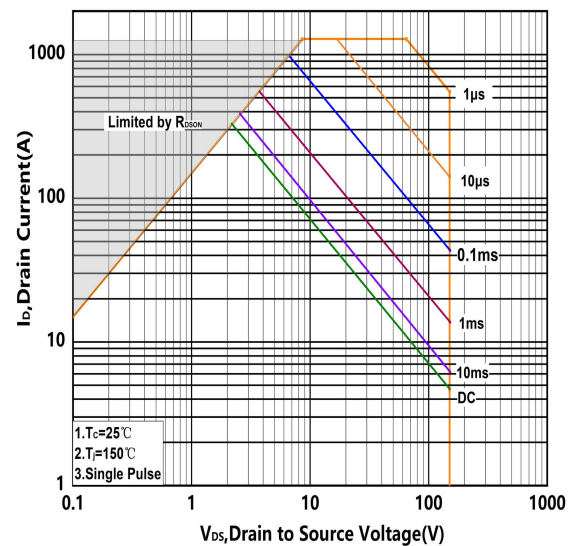
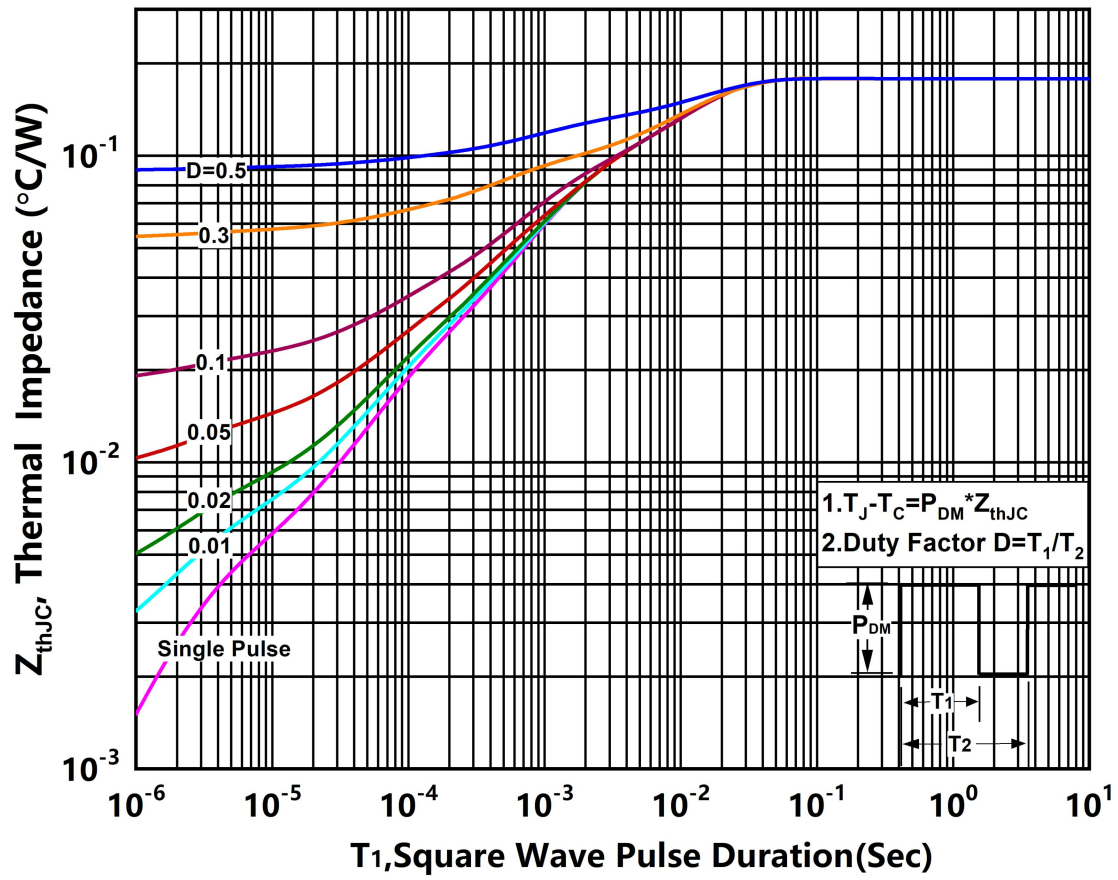
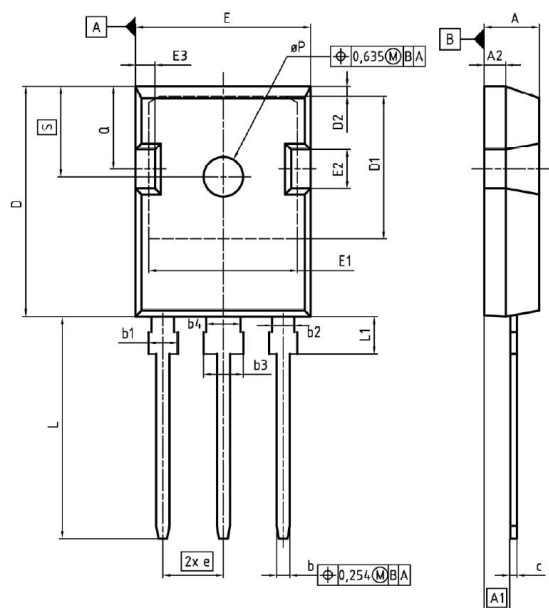


Figure.13 Transient Thermal Impedance (Junction - Case)



Package Outline:TO-247-3L



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.83	5.21	0.190	0.205
A1	2.27	2.54	0.089	0.100
A2	1.85	2.16	0.073	0.085
b	1.07	1.33	0.042	0.052
b1	1.90	2.41	0.075	0.095
b2	1.90	2.16	0.075	0.085
b3	2.87	3.38	0.113	0.133
b4	2.87	3.13	0.113	0.123
c	0.55	0.68	0.022	0.027
D	20.80	21.10	0.819	0.831
D1	16.25	17.65	0.640	0.695
D2	0.95	1.35	0.037	0.053
E	15.70	16.13	0.618	0.635
E1	13.10	14.15	0.516	0.557
E2	3.68	5.10	0.145	0.201
E3	1.00	2.60	0.039	0.102
e	5.44(BSC)		0.214(BSC)	
N	3		3	
L	19.80	20.32	0.780	0.800
L1	4.10	4.47	0.161	0.176
ØP	3.50	3.70	0.138	0.146
Q	5.49	6.00	0.216	0.236
S	6.04	6.30	0.238	0.248