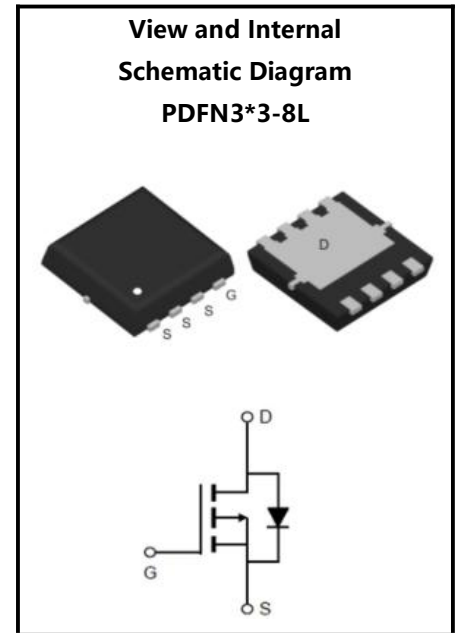


MOSFET

-37A, -30V, 11mΩ, P-CHANNEL MOSFET

Description and Applications

- ◆ Trench Power MOSFET technology
- ◆ Excellent $R_{DS(ON)}$
- ◆ Load switch or other general applications
- ◆ Power management in portable / desktop PCs



Parameter	Values	Unit
BV_{DSS}	-30	V
I_D	-37	A
$R_{DS(on)(max)}$	11	mΩ
$V_{GS(th)}(Typ)$	-1.5	V

Ordering Code	Marking	Package	Packaging
X21357UA	X21357UA	PDFN3*3-8L	Tape & Reel

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}	-	-	-30	V	$V_{GS}=0V$
Gate-Source Voltage	V_{GS}	-20	-	20	V	$V_{DS}=0V$
Continuous Drain Current(Note 1)	I_D	-	-	-37	A	$T_C=25^{\circ}C$
		-	-	-24	A	$T_C=100^{\circ}C$
Pulsed Drain Current(Note 2)	I_{DM}	-	-	-82	A	-
Maximum Power Dissipation	P_D	-	-	24	W	$T_C=25^{\circ}C$
		-	-	9.6	W	$T_C=100^{\circ}C$
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55	-	150	$^{\circ}C$	-

Thermal Characteristics

Parameter	Symbol	Values			Unit	Note/Test Conditions
		Min	Typ	Max		
Thermal resistance , Junction to Case	$R_{th(J-C)}$	-	4.5	5.2	$^{\circ}C/W$	-
Thermal resistance , Junction to Ambient	$R_{th(J-a)}$	-	49	60	$^{\circ}C/W$	-

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}	-30	-	-	V	$V_{GS}=0V, I_D=-250\mu A$
Zero Gate Voltage Drain Current	I_{DSS}	-	-	-1	μA	$V_{DS}=-30V, V_{GS}=0V$
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	$V_{GS(th)}$	-1	-	-2	V	$V_{DS}=V_{GS}, I_D=-250\mu A$
Drain-Source On-State Resistance	$R_{DS(on)}$	-	8	11	m Ω	$V_{GS}=-10V, I_D=-17A$
		-	12	17.5	m Ω	$V_{GS}=-4.5V, I_D=-13A$
Gate resistance	R_g	-	4.4	-	Ω	$V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$
Forward Transconductance	g_{fs}	-	61.8	-	S	$V_{DS}=-5V, I_D=-17A$

Dynamic characteristics

Parameter	Symbol	Values			Unit	Note/Test Conditions
		Min	Typ	Max		
Input Capacitance	C_{iss}	-	1821	-	pF	$V_{DS}=-15V, V_{GS}=0V, f=1.0\text{MHz}$
Output Capacitance	C_{oss}	-	237	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	205	-	pF	
Turn-On Delay Time	$t_{d(on)}$	-	9	-	ns	$V_{DD}=-15V, R_G=3\Omega, V_{GS}=-10V, R_L=0.9\Omega$
Turn-On Rise Time	t_r	-	71	-	ns	
Turn-Off Delay Time	$t_{d(off)}$	-	46	-	ns	
Turn-Off Fall Time	t_f	-	77	-	ns	

Gate charge characteristics

Parameter	Symbol	Values			Unit	Note/Test Conditions
		Min	Typ	Max		
Total Gate Charge	Q_g	-	37	-	nC	$V_{DS}=-15V, I_D=-17A, V_{GS}=-10V$
Gate-Source Charge	Q_{gs}	-	7.3	-	nC	
Gate-Drain Charge	Q_{gd}	-	7.7	-	nC	

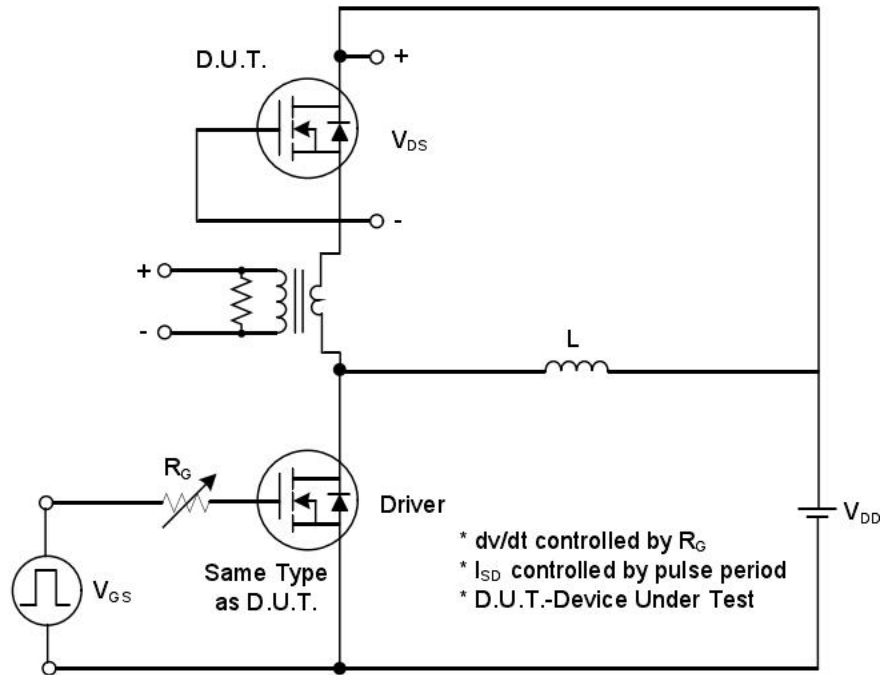
Reverse diode

Parameter	Symbol	Values			Unit	Note/Test Conditions
		Min	Typ	Max		
Continuous Diode Forward Current	I_S	-	-	-37	A	-
Diode Forward Voltage	V_{SD}	-	-	-1	V	$I_S=-1A, V_{GS}=0V$
Body Diode Reverse Recovery Time	t_{rr}	-	13.8	-	ns	$V_{GS}=0V, I_S=-17A, di/dt=-100A/\mu s$
Body Diode Reverse Recovery Charge	Q_{rr}	-	1.2	-	nC	

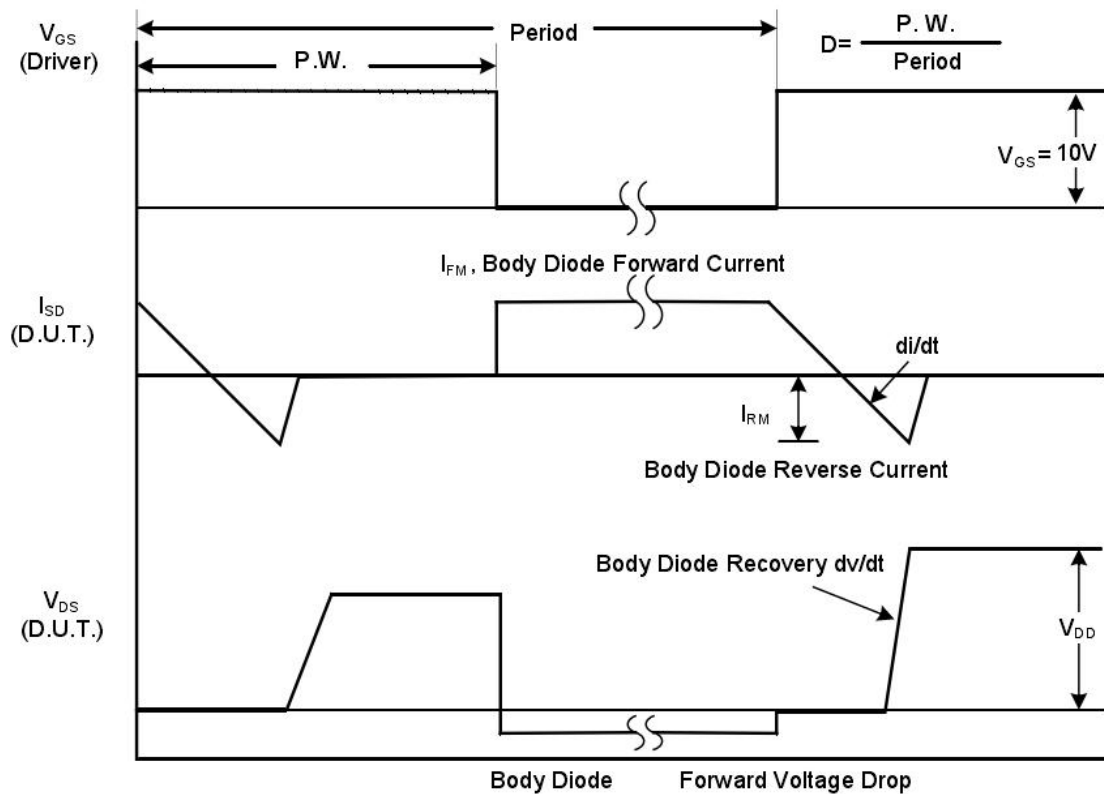
Notes

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 $T_{j_Max} = 150^{\circ}\text{C}$.

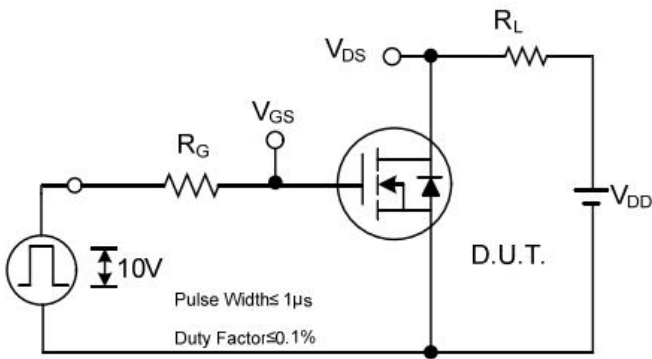
RATING AND CHARACTERISTIC CURVES



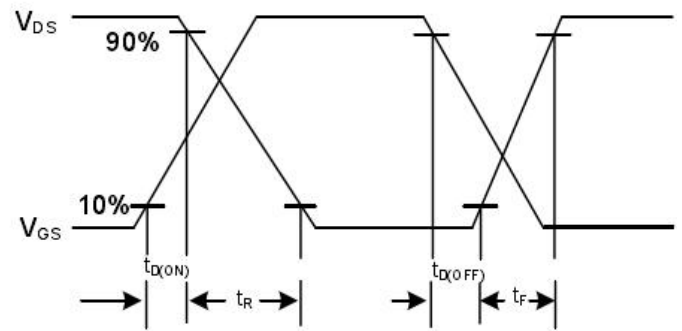
Peak Diode Recovery dv/dt Test Circuit



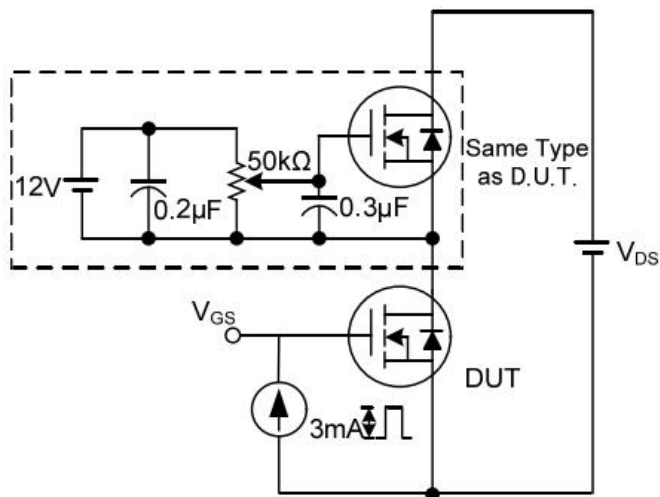
Peak Diode Recovery dv/dt Waveforms



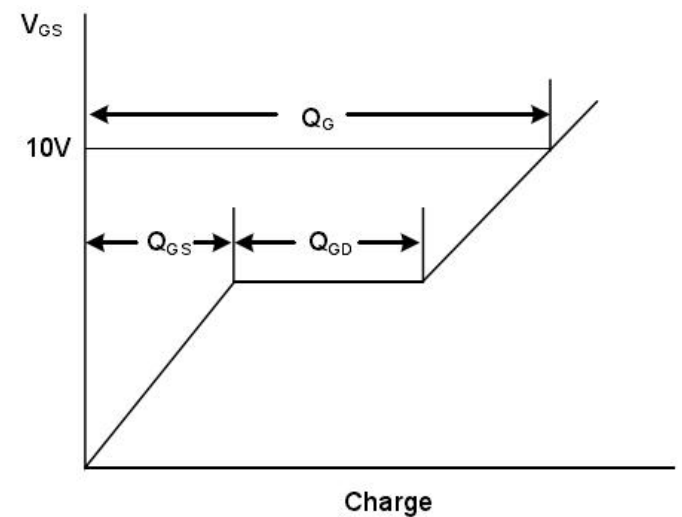
Switching Test Circuit



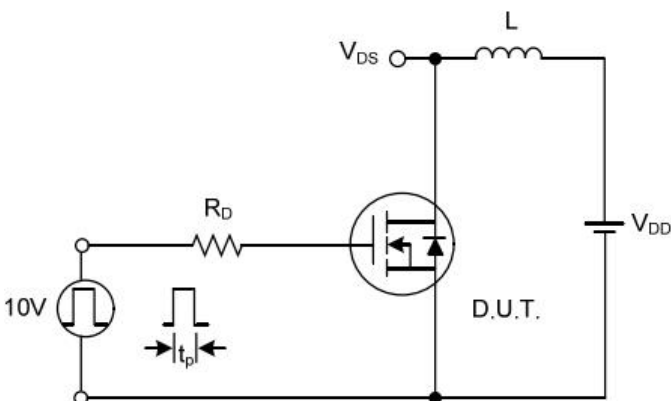
Switching Waveforms



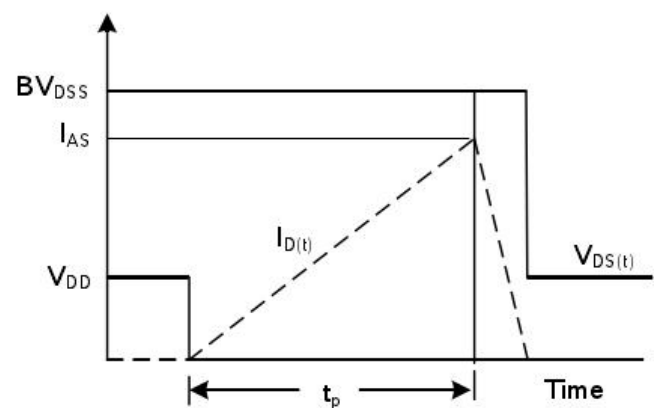
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

RATING AND CHARACTERISTIC CURVES

Figure.1 On-Region Characteristics

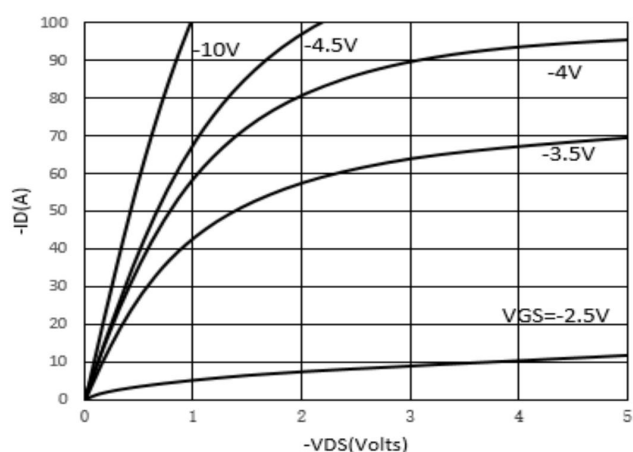


Figure.2 Transfer Characteristics

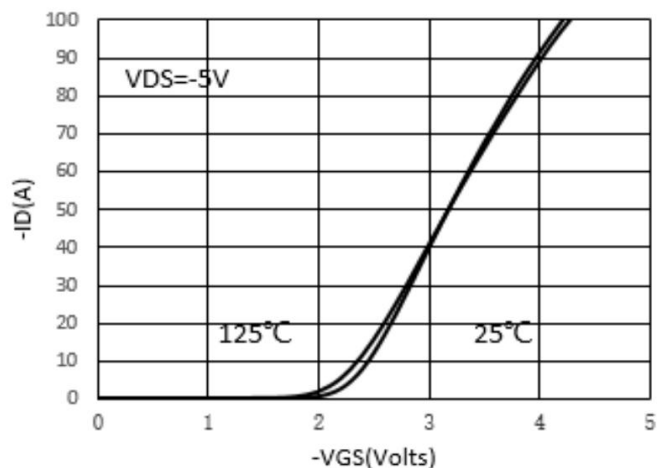


Figure.3 On-Resistance vs. Drain Current and Gate Voltage

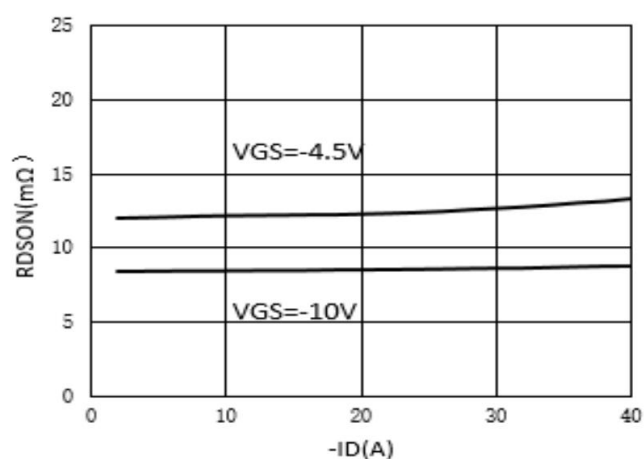


Figure.4 On-Resistance vs. Junction Temperature

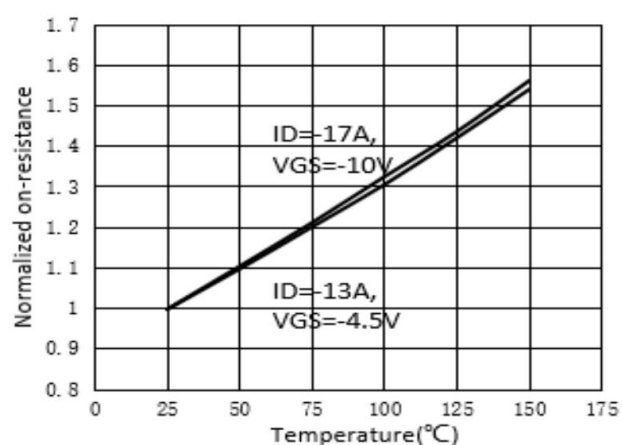


Figure.5 On-Resistance vs. Gate-Source Voltage

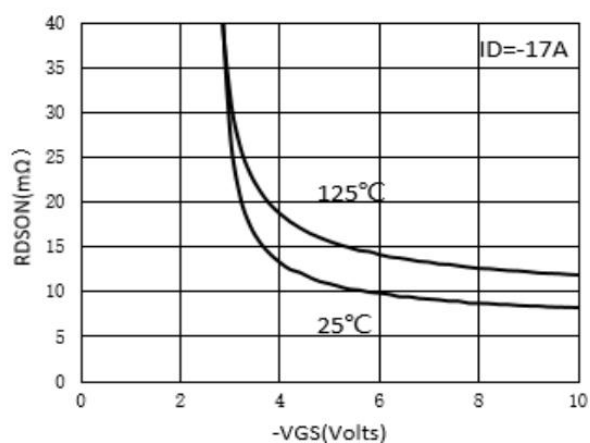


Figure.6 Body-Diode Characteristics

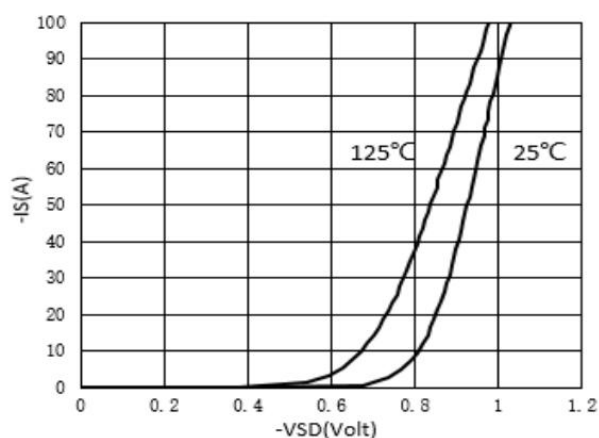


Figure.7 Gate-Charge Characteristics

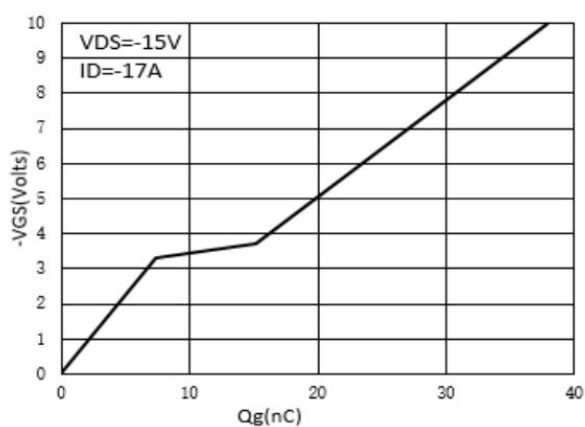


Figure.8 Capacitance Characteristics

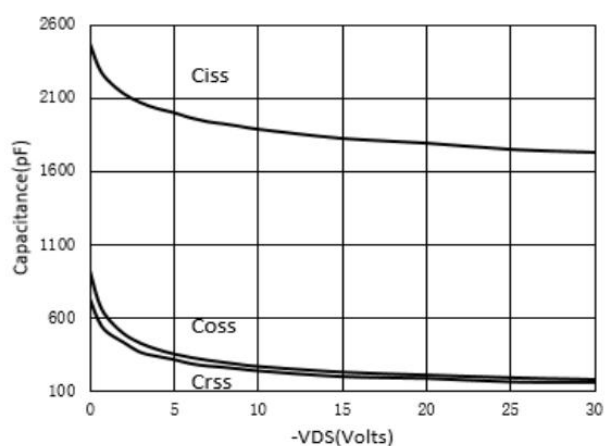


Figure.9 Maximum Forward Biased Safe Operating Area

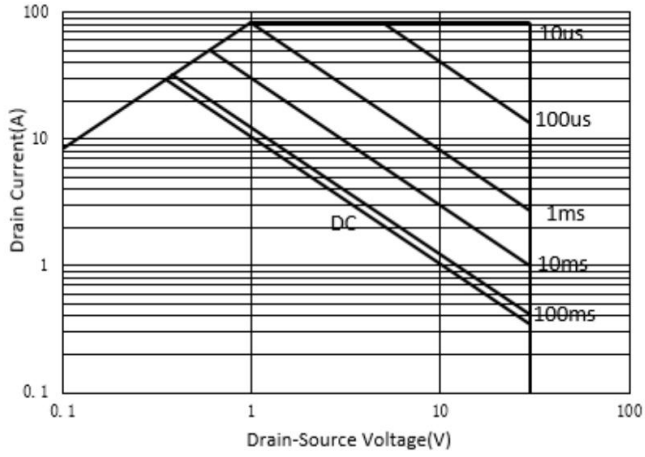


Figure.10 Single Pulse Power Rating Junction-to-Ambient

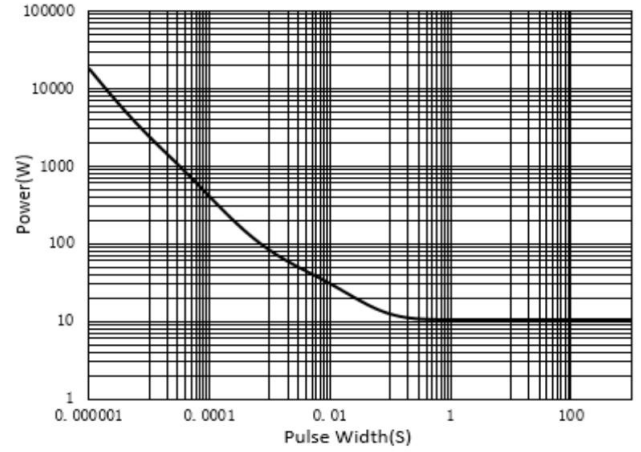
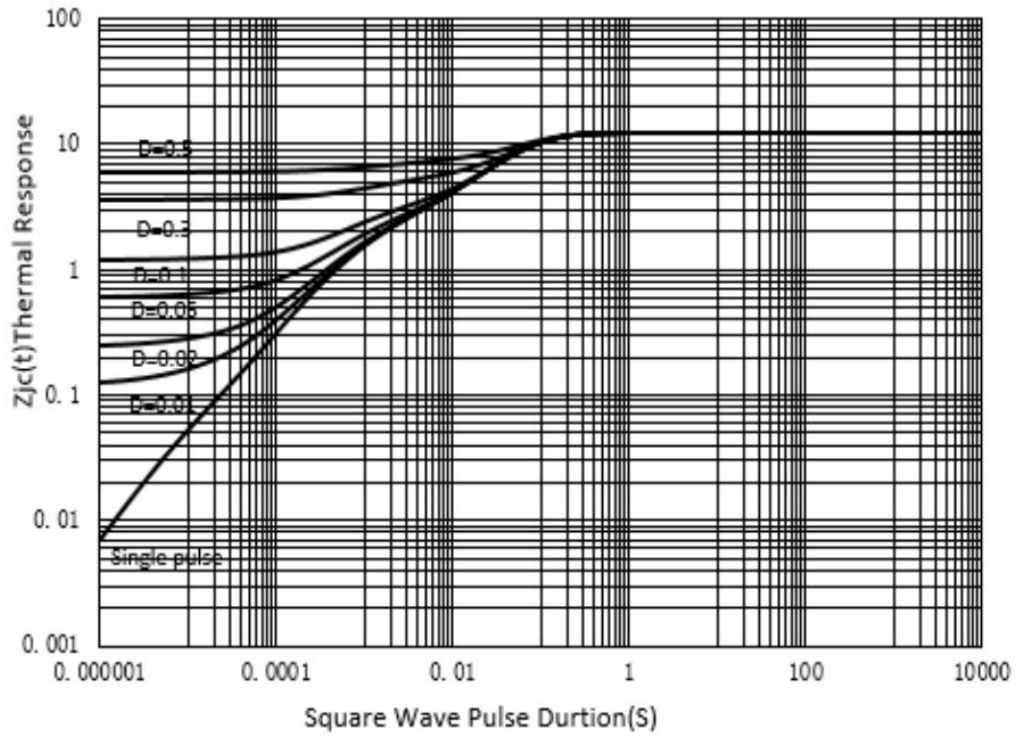
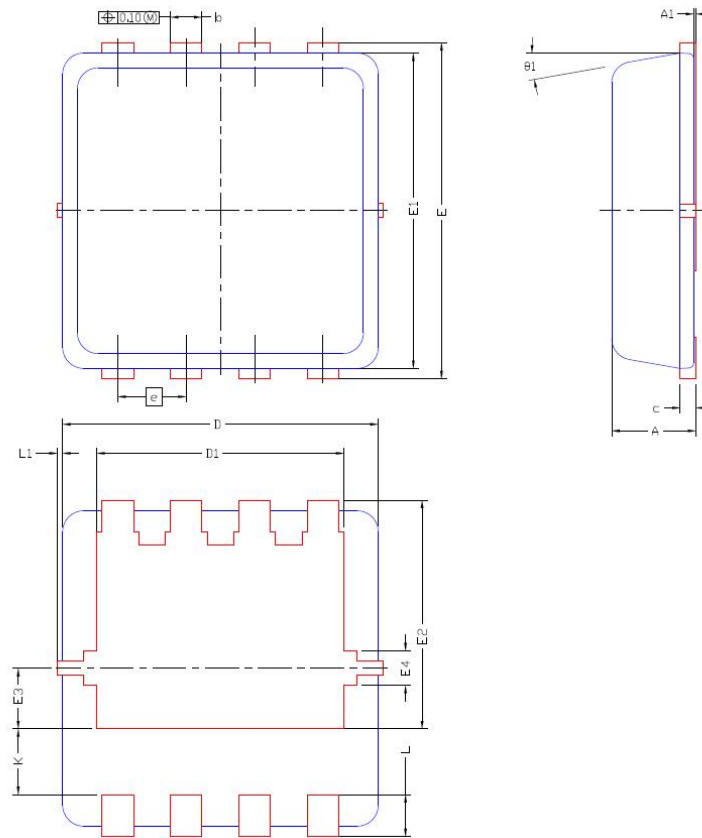


Figure 11: Maximum Transient Thermal Impedance



Package Outline: PDFN3*3-8L



DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.700	0.80	0.900	0.028	0.031	0.035
A1	0.00	-	0.05	0.000	-	0.002
b	0.24	0.30	0.35	0.009	0.012	0.014
C	0.10	0.152	0.25	0.004	0.006	0.010
D	3.00BSC			0.118BSC		
D1	2.25	2.35	2.45	0.089	0.093	0.096
E	3.20BSC			0.126BSC		
E1	3.00BSC			0.118BSC		
E2	2.025	2.175	2.375	0.080	0.086	0.092
E3	0.480	0.575	0.675	0.019	0.023	0.027
E4	0.33BSC			0.013BSC		
e	0.65BSC			0.026BSC		
K	0.475	0.625	0.775	0.019	0.025	0.031
L	0.30	0.40	0.50	0.012	0.016	0.020
L1	0	-	0.100	0	-	0.004
Ø1	0°	10°	12°	0°	10°	12°