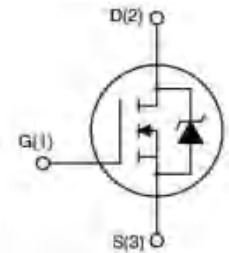


# APG022N06G

## N-Channel Enhancement Mosfet

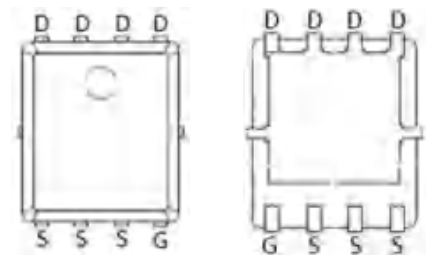
### Feature

- 60V,150A  
 $R_{DS(ON)} < 2.3m\Omega @ V_{GS}=10V$  (TYP:1.9m $\Omega$ )  
 $R_{DS(ON)} < 3.5m\Omega @ V_{GS}=4.5V$  (TYP:3.0m $\Omega$ )
- Split Gate Trench Technology
- Lead free product is acquired
- Excellent  $R_{DS(ON)}$  and Low Gate Charge



### Application

- PWM applications
- Load Switch
- Power management



PDFN5X6

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
G022N06G	APG022N06G	PDFN5X6	-	-	5000

### ABSOLUTE MAXIMUM RATINGS ( $T_a=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current ( $T_a=25^\circ\text{C}$ )	$I_D$	150	A
Continuous Drain Current ( $T_a=100^\circ\text{C}$ )	$I_D$	100	A
Pulsed Drain Current <sup>(1)</sup>	$I_{DM}$	450	A
Single Pulsed Avalanche Energy <sup>(2)</sup>	$E_{AS}$	520	mJ
Power Dissipation	$P_D$	140	W
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.89	$^\circ\text{C/W}$
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	45	$^\circ\text{C/W}$
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55~ +150	$^\circ\text{C}$

**MOSFET ELECTRICAL CHARACTERISTICS(T<sub>a</sub>=25°C unless otherwise noted)**

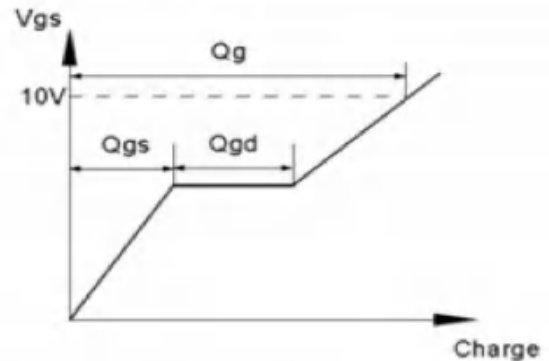
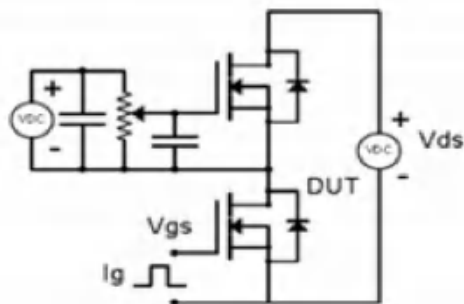
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA	60	-	-	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =60V, V <sub>GS</sub> = 0V	-	-	1	μA
Gate-body leakage current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	-	-	±100	nA
Gate threshold voltage <sup>(3)</sup>	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.5	2.0	3.0	V
Drain-source on-resistance <sup>(3)</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	-	1.9	2.3	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A	-	3.0	3.5	mΩ
Forward Threshold Voltage	g <sub>fs</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =20A	-	75	-	S
<b>Dynamic characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f =100KHz	-	6052	-	pF
Output Capacitance	C <sub>oss</sub>		-	1470	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	185	-	
<b>Switching characteristics</b>						
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> =30V, I <sub>D</sub> =25A, V <sub>GS</sub> =10V, R <sub>G</sub> =2Ω	-	8	-	ns
Turn-on rise time	t <sub>r</sub>		-	15	-	
Turn-off delay time	t <sub>d(off)</sub>		-	55	-	
Turn-off fall time	t <sub>f</sub>		-	25	-	
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =30V, I <sub>D</sub> =25A, V <sub>GS</sub> =10V	-	110	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	20	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	21	-	
Reverse Recovery Chrage	Q <sub>rr</sub>	I <sub>F</sub> =20A, di/dt=100A/us		100		nC
Reverse Recovery Time	T <sub>rr</sub>	I <sub>F</sub> =20A, di/dt=100A/us		72		ns
<b>Source-Drain Diode characteristics</b>						
Diode Forward voltage <sup>(3)</sup>	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =10A	-	-	1.2	V
Diode Forward current <sup>(4)</sup>	I <sub>S</sub>		-	-	150	A

**Notes:**

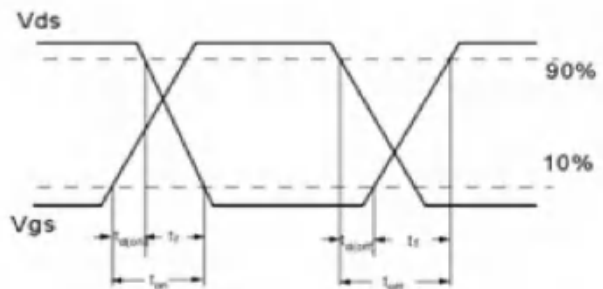
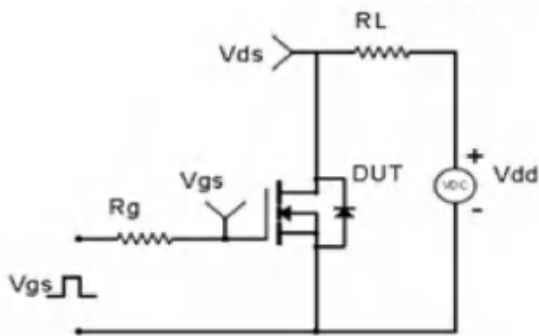
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition: T<sub>J</sub>=25°C, V<sub>DD</sub>=48V, R<sub>G</sub>=25 Ω, L=0.5Mh
3. Pulse Test: pulse width≤300μs, duty cycle≤2%
4. Surface Mounted on FR4 Board, t≤10 sec

**Test Circuit & Waveform**

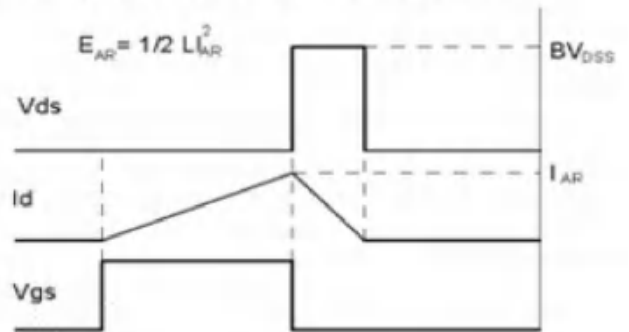
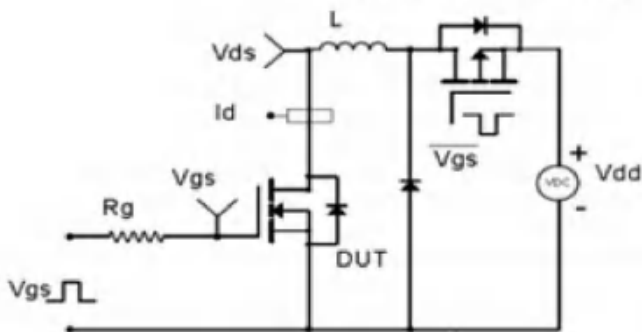
Gate Charge Test Circuit & Waveform



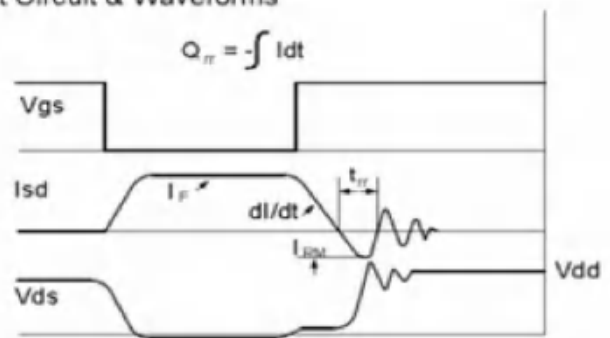
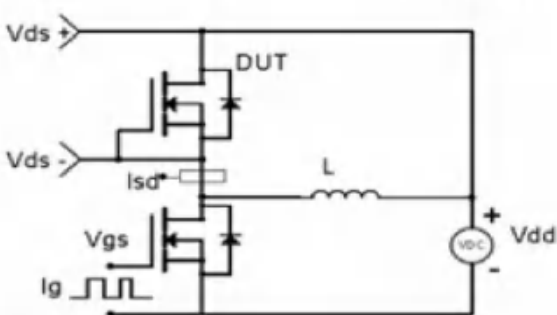
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



**Typical Performance Characteristics**

Fig.1 Power Dissipation Derating Curve

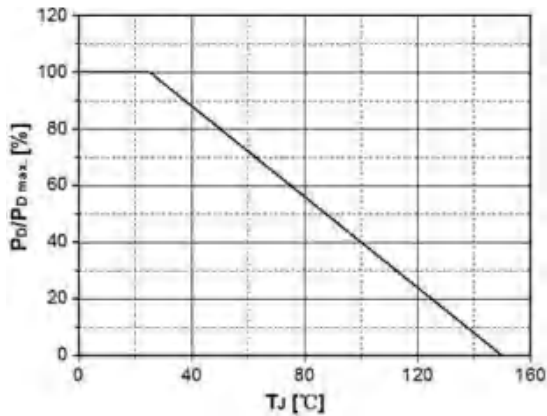


Fig.2 Avalanche Energy Derating Curve vs. Junction Temperature

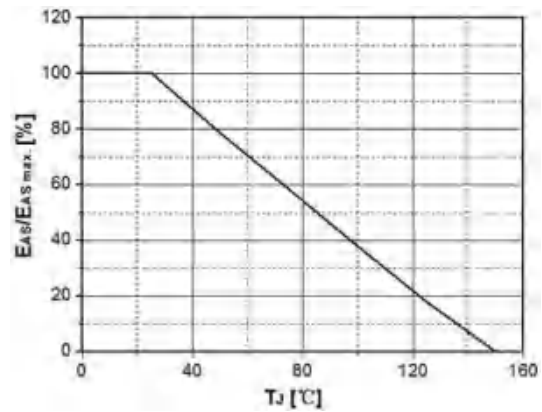


Fig.3 Typical Output Characteristics

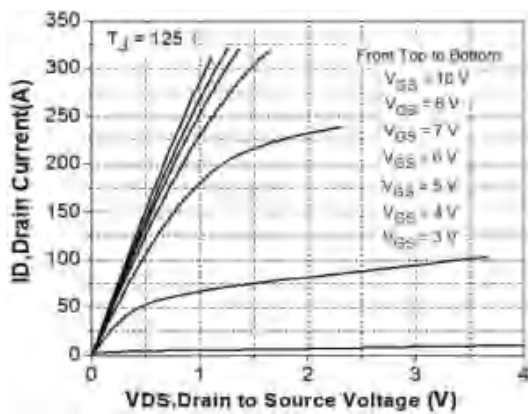


Fig. 4 Transconductance vs. Drain Current

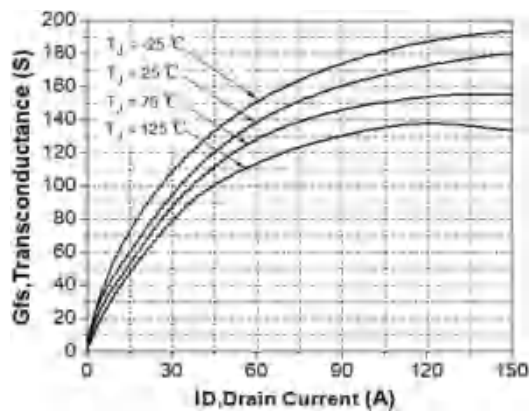


Fig.5 Typical Transfer Characteristics

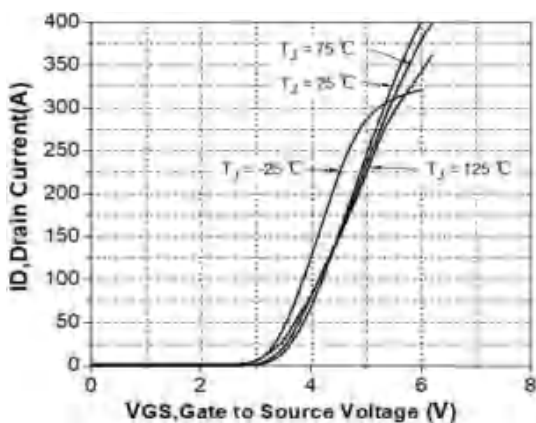


Fig. 6 State Resistance vs. Drain Current @-25°C

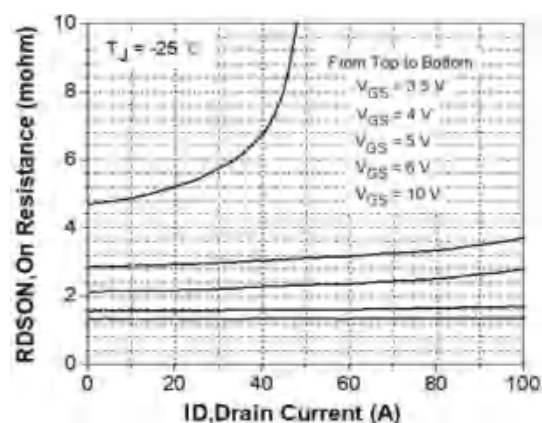


Fig.7 State Resistance vs. Drain Current @25°C

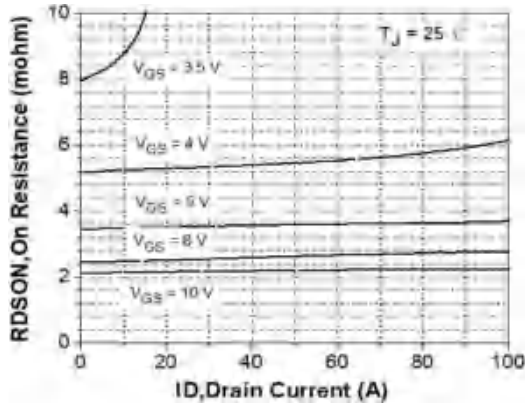


Fig. 8 State Resistance vs. Drain Current @125°C

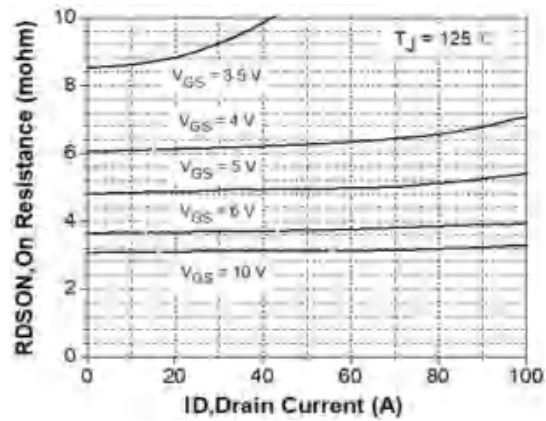


Fig.9 Typical Capacitance vs. Drain Source Voltage

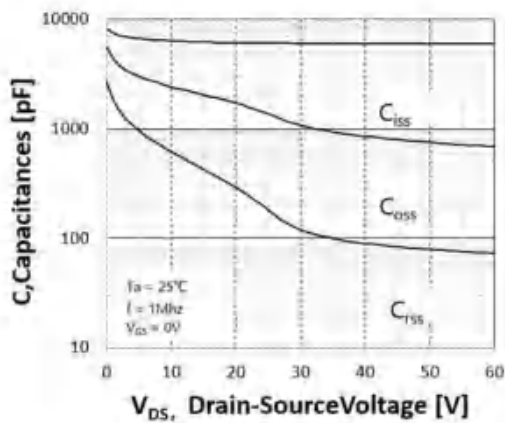


Fig.10 Dynamic Input Characteristics

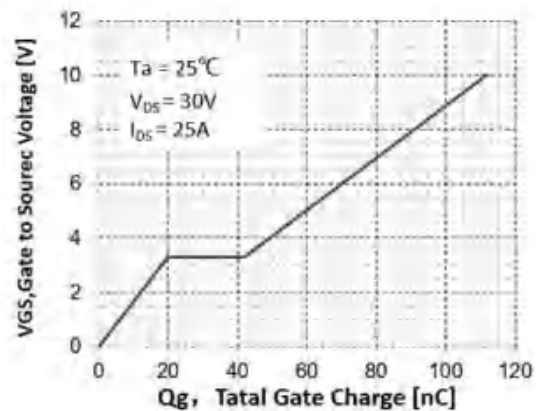


Fig.11 Breakdown Voltage vs. Junction Temperature

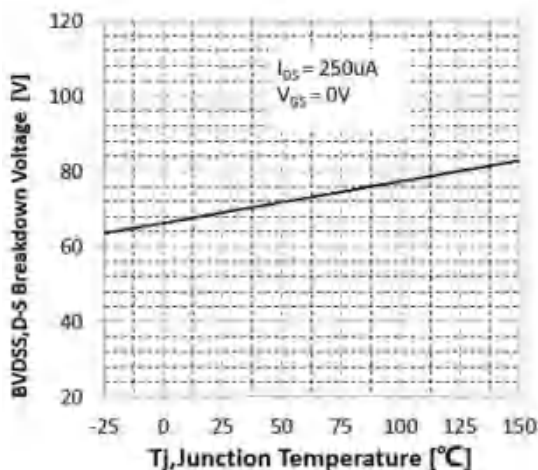


Fig. 12 Gate Threshold Voltage vs. Junction Temperature

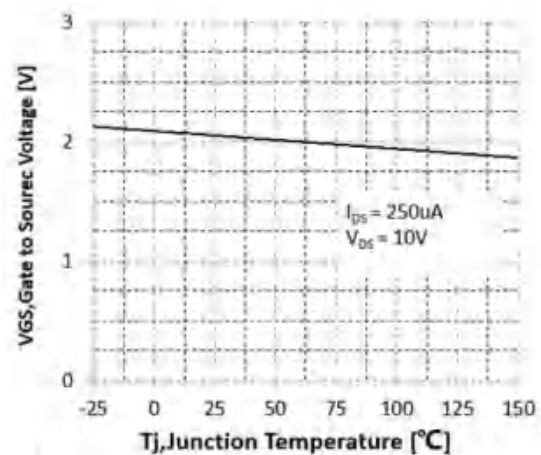


Fig.13 On-Resistance Variation vs. Junction Temperature

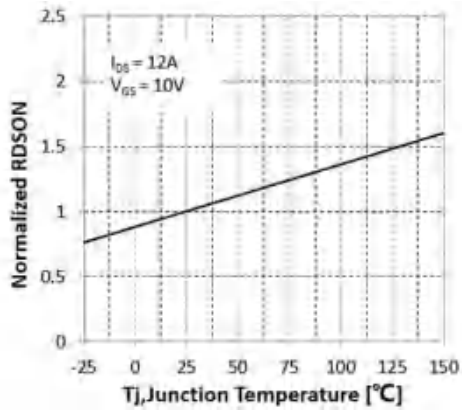


Fig.14 Maximum Drain Current vs. Case Temperature

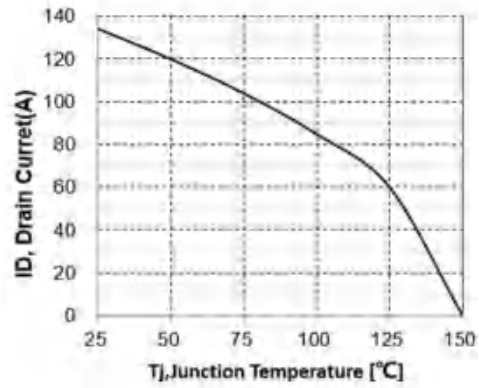


Fig.15 Body Diode Forward Voltage vs. Reverse Drain Current

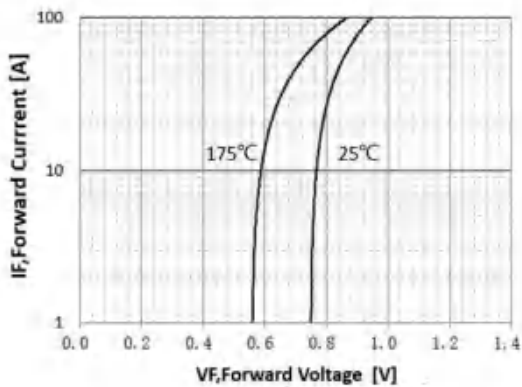


Fig.16 Safe Operating Area

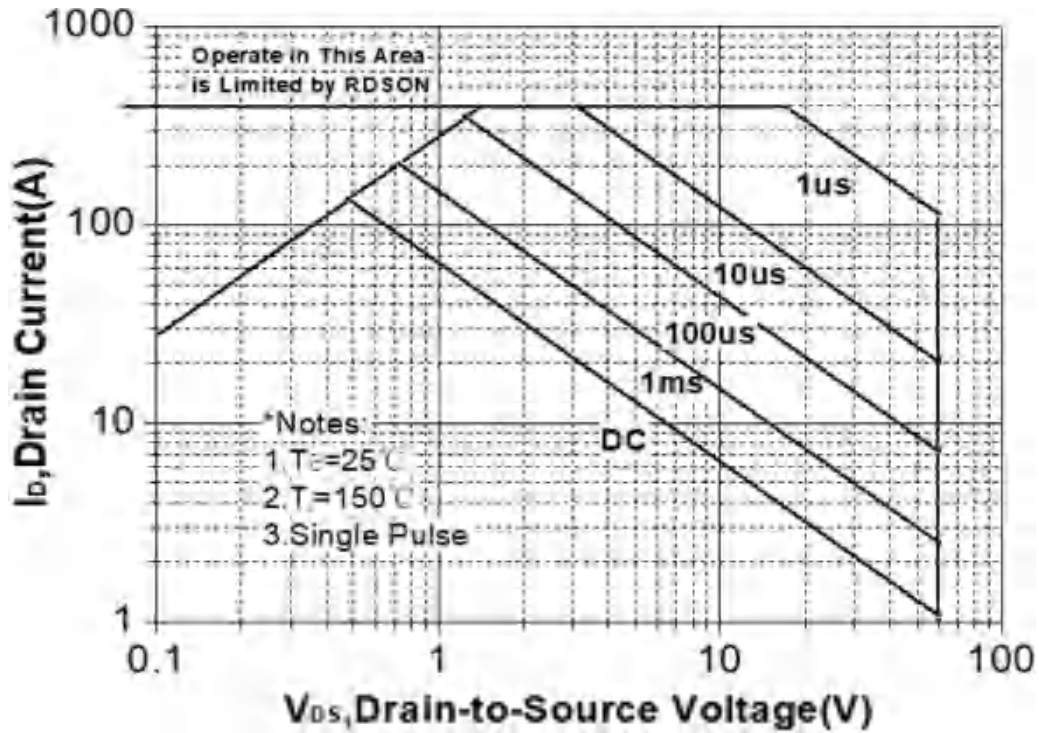
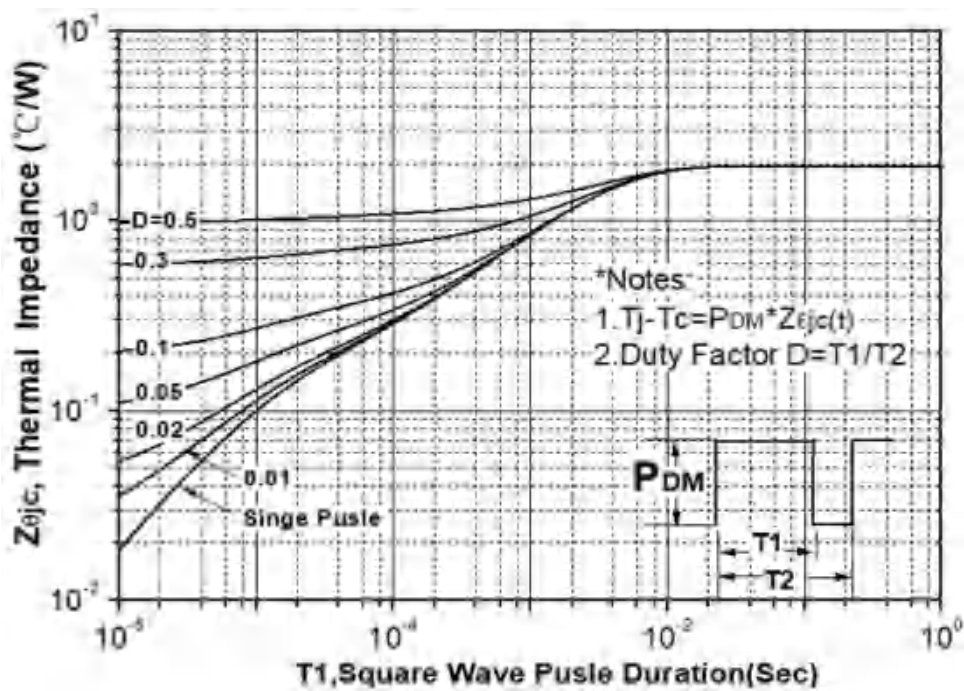
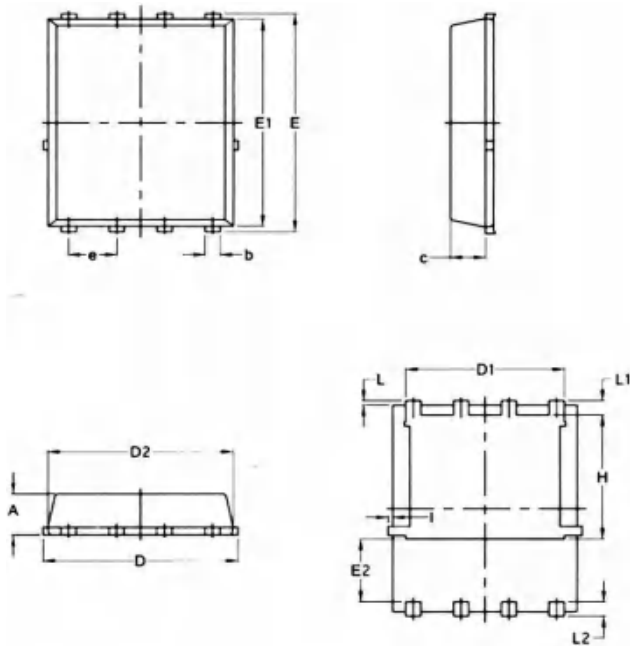


Fig. 17 Transient Thermal Response Curve



**PDFN5X6 Package Information**



PDFN5X6

SYMBOL	COMMON			
	MM		INCH	
	MIN.	MAX.	MIN.	MAX.
A	1.03	1.17	0.0406	0.0461
b	0.34	0.48	0.0134	0.0189
c	0.824	0.970	0.0324	0.0382
D	4.80	5.40	0.1890	0.2126
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.00	0.1890	0.1969
E	5.95	6.15	0.2343	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	1.60	—	0.0630	—
e	1.27 BSC		0.05 BSC	
L	0.05	0.25	0.0020	0.0098
L1	0.38	0.50	0.0150	0.0197
L2	0.38	0.50	0.0150	0.0197
H	3.30	3.50	0.1299	0.1378
I	—	0.18	—	0.0070