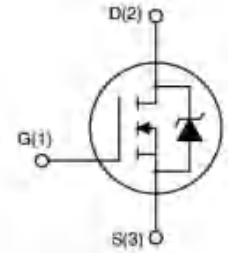


# APG038N01G

## N-Channel Enhancement Mosfet

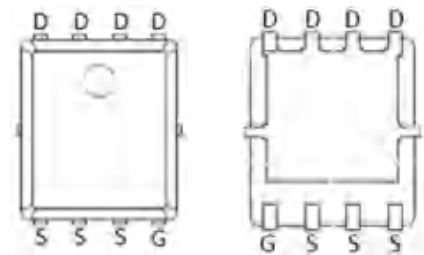
### Feature

- 100V,104A  
 $R_{DS(ON)} < 3.8m\Omega @ V_{GS}=10V$  (TYP:3.1m $\Omega$ )  
 $R_{DS(ON)} < 4.9m\Omega @ V_{GS}=4.5V$  (TYP:4.2m $\Omega$ )
- 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)
G038N01G	APG038N01G	PDFN5X6	-	-	5000

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current ( $T_a=25^\circ\text{C}$ )	$I_D$	104	A
Continuous Drain Current ( $T_a=100^\circ\text{C}$ )	$I_D$	65.7	A
Pulsed Drain Current <sup>(1)</sup>	$I_{DM}$	416	A
Single Pulsed Avalanche Energy <sup>(2)</sup>	$E_{AS}$	324	mJ
Power Dissipation	$P_D$	67.5	W
Thermal Resistance from Junction to Case	$R_{\theta JC}$	1.85	$^\circ\text{C/W}$
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	51.4	$^\circ\text{C/W}$
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	100	-	-	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =100V, 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> =30A	-	3.1	3.8	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A	-	4.2	4.9	mΩ
Gate Resistance	R <sub>g</sub>	V <sub>DS</sub> =V <sub>GS</sub> =0V, f =1MHz	-	1.7	-	Ω
<b>Dynamic characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f =1MHz	-	5980	-	pF
Output Capacitance	C <sub>oss</sub>		-	1270	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	31.5	-	
<b>Switching characteristics</b>						
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V, R <sub>G</sub> =3Ω	-	23.5	-	ns
Turn-on rise time	t <sub>r</sub>		-	33.6	-	
Turn-off delay time	t <sub>d(off)</sub>		-	89	-	
Turn-off fall time	t <sub>f</sub>		-	25.7	-	
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =50V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V	-	100	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	17	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	20.7	-	
Reverse Recovery Chrage	Q <sub>rr</sub>	I <sub>F</sub> =80A, di/dt=100A/us		103.8		nC
Reverse Recovery Time	T <sub>rr</sub>	I <sub>F</sub> =80A, di/dt=100A/us		62.6		ns
<b>Source-Drain Diode characteristics</b>						
Diode Forward voltage <sup>(3)</sup>	V <sub>DS</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =40A	-	0.85	1.3	V
Diode Forward current <sup>(4)</sup>	I <sub>S</sub>		-	-	104	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>=50V, R<sub>G</sub>=25 Ω, L=0.5Mh, I<sub>AS</sub>=36A
3. Pulse Test: pulse width≤300μs, duty cycle≤2%
4. Surface Mounted on FR4 Board, t≤10 sec

■ Test circuits and waveforms

Figure A: Gate Charge Test Circuit & Waveforms

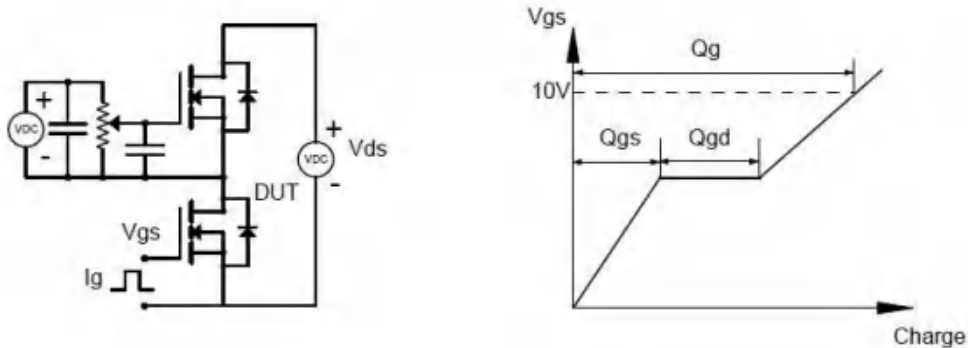


Figure B: Resistive Switching Test Circuit & Waveforms

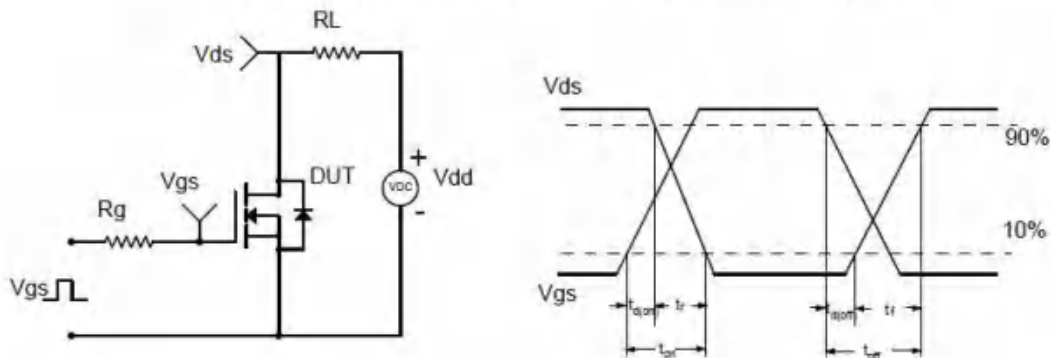


Figure C: Unclamped Inductive Switching (UIS) Test

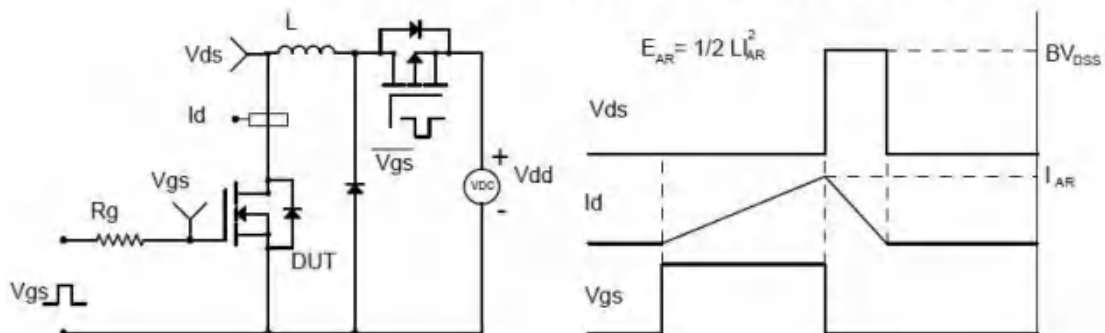
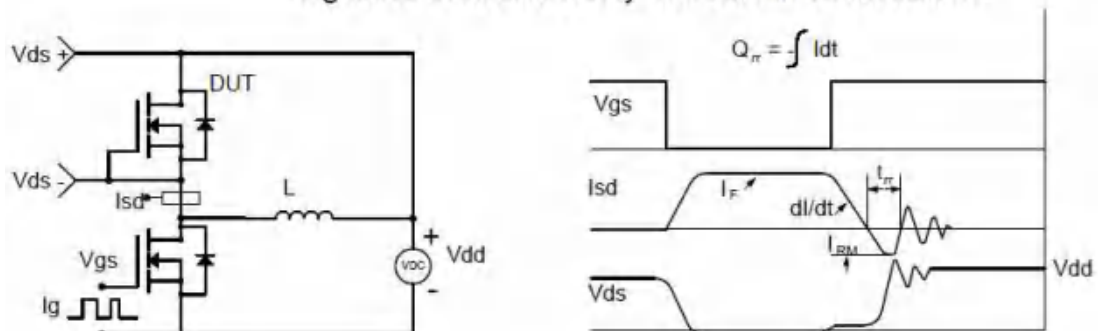


Figure D: Diode Recovery Test Circuit & Waveforms



**Typical Electronic and Thermal Characteristics**

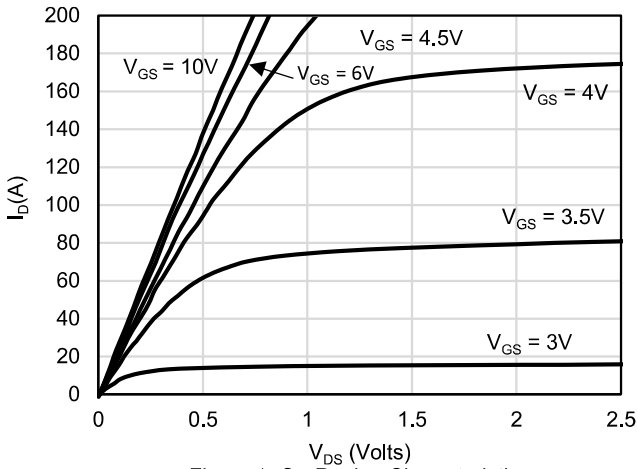


Figure 1: On-Region Characteristics

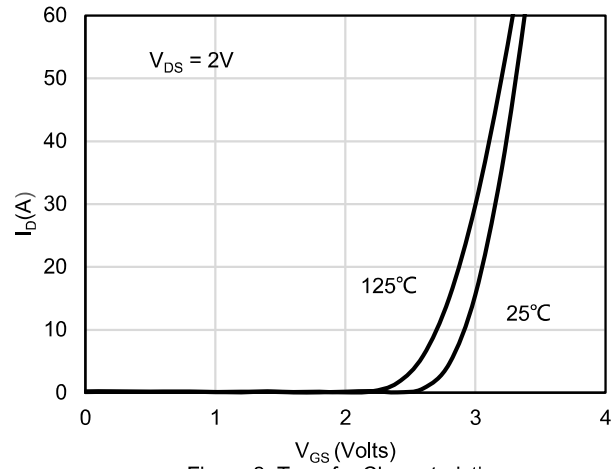


Figure 2: Transfer Characteristics

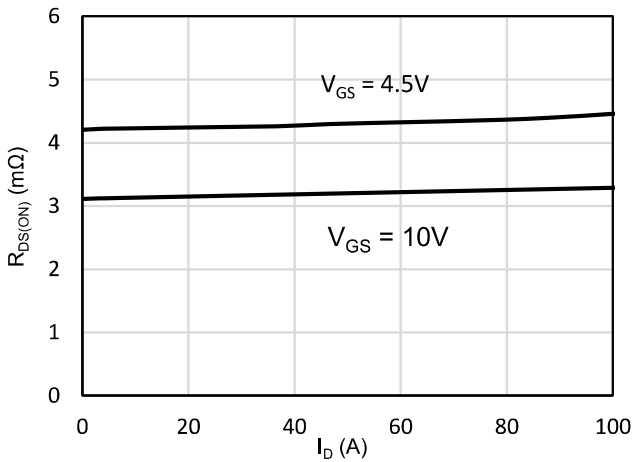


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

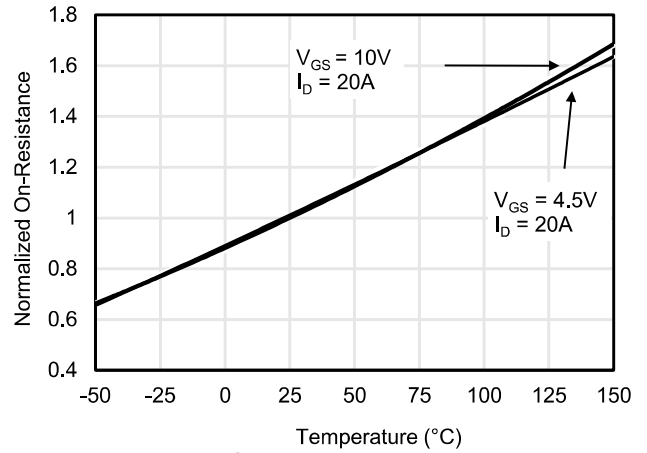


Figure 4: On-Resistance vs. Junction Temperature

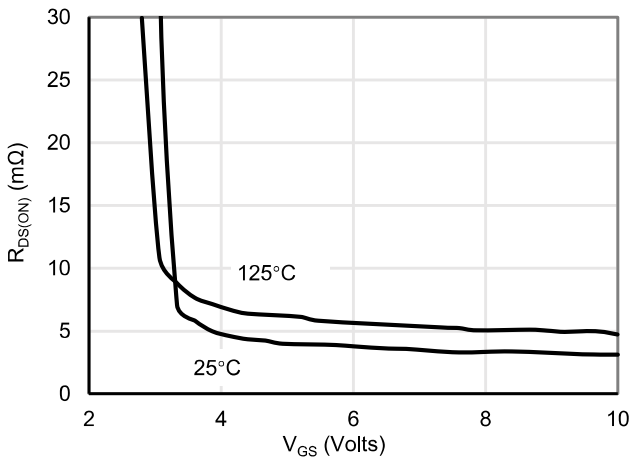


Figure 5: On-Resistance vs. Gate-Source Voltage

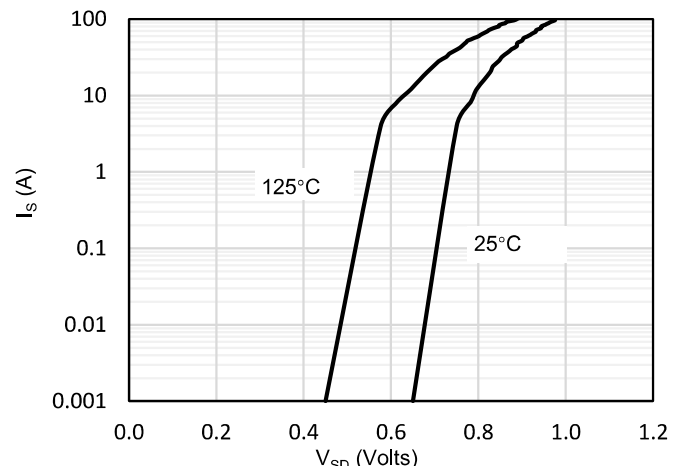


Figure 6: Body-Diode Characteristics

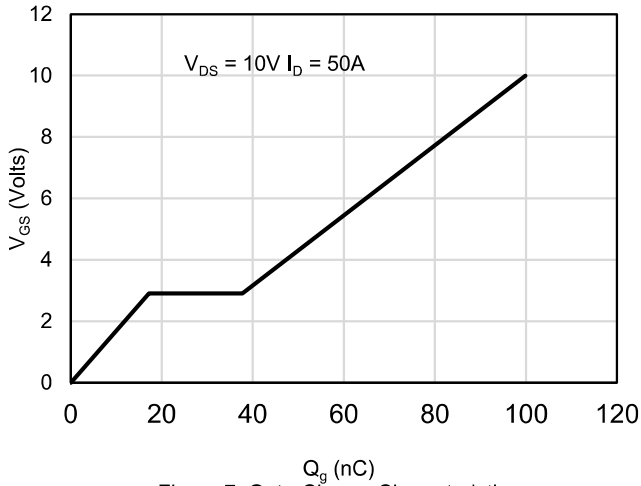


Figure 7: Gate-Charge Characteristics

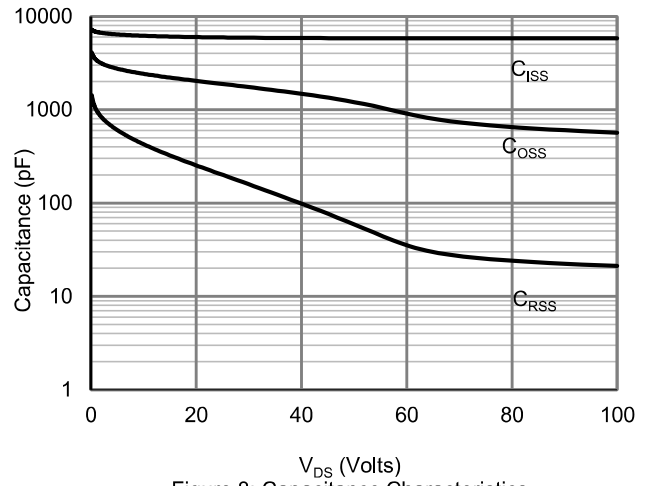


Figure 8: Capacitance Characteristics

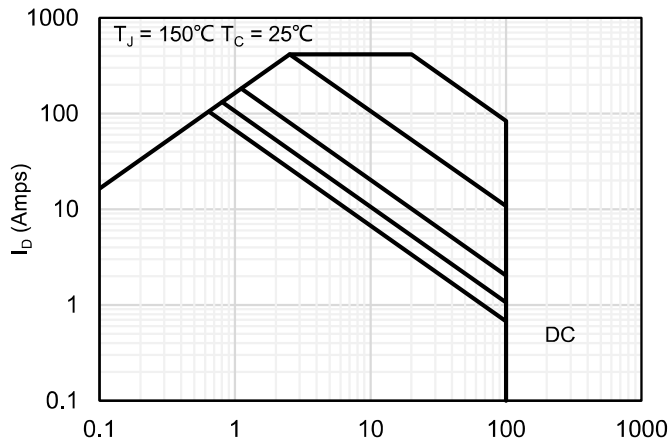


Figure 9: Maximum Forward Biased Safe Operating Area

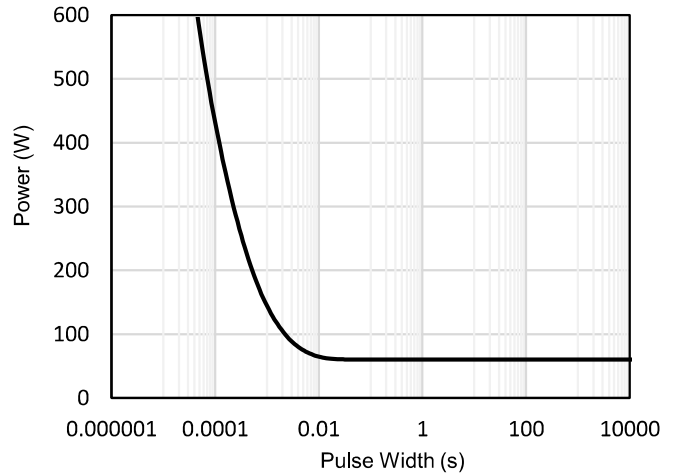


Figure 10: Single Pulse Power Rating Junction-to-Case

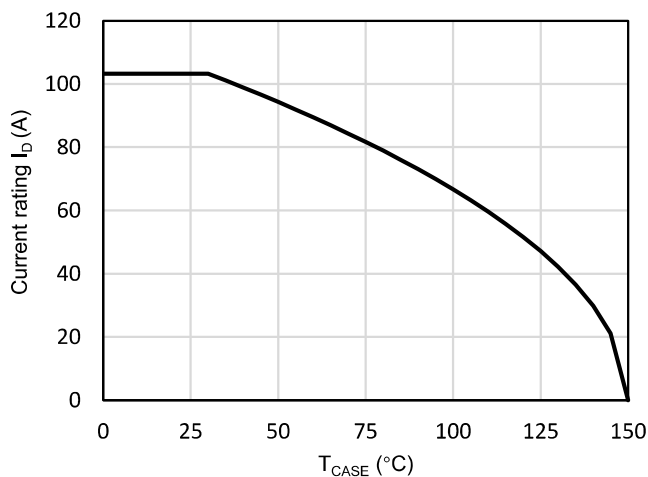


Figure 11: Current De-rating

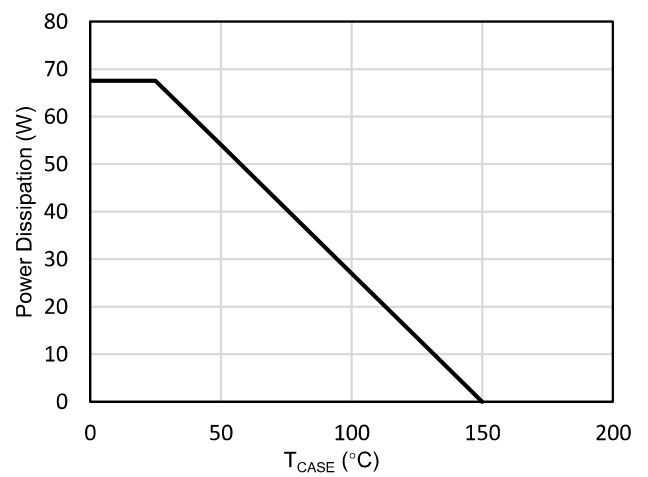


Figure 12: Power De-rating

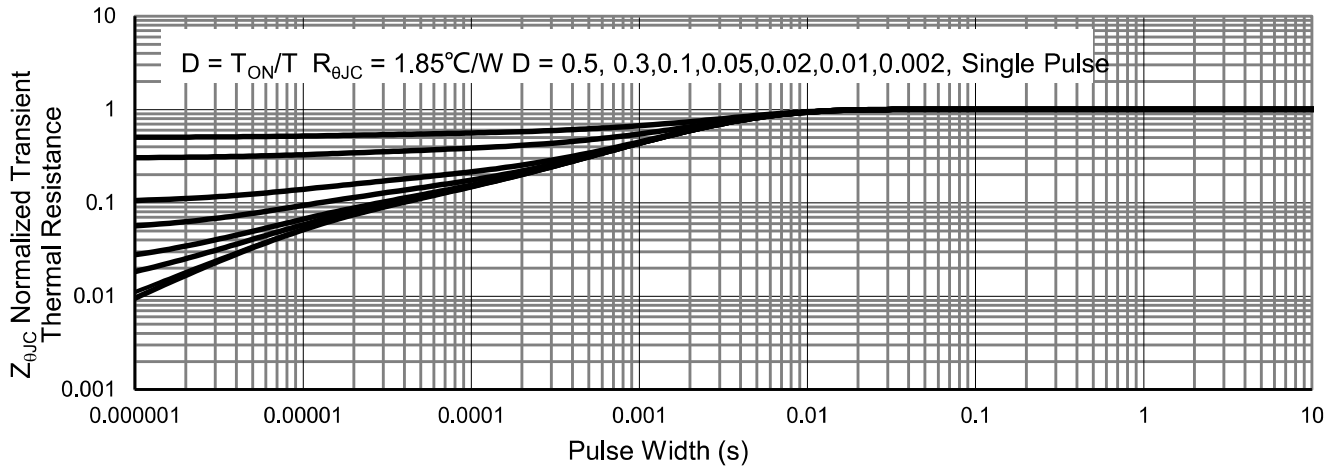
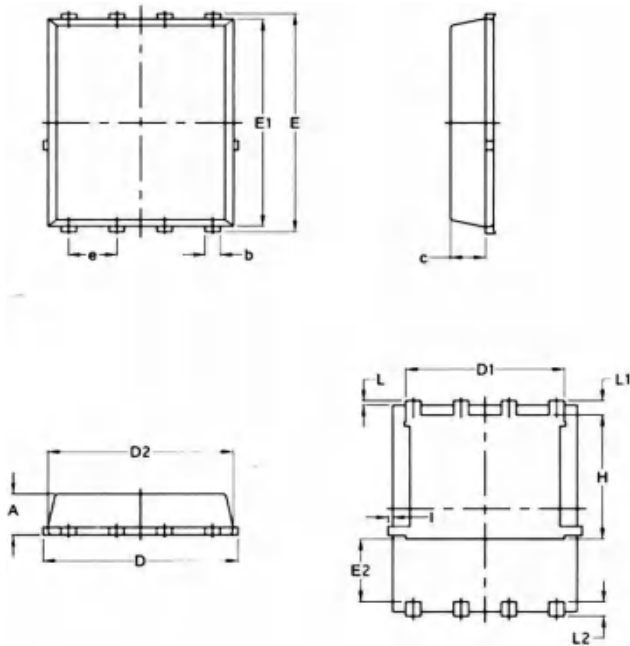


Figure 13: Normalized Maximum Transient Thermal Impedance

**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