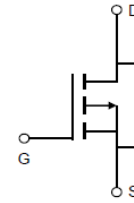


Feature

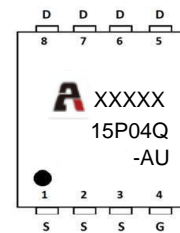
- -40V,-15A
 $R_{DS(ON)} < 33m\Omega @ V_{GS} = -10V$ TYP:27 m Ω
 $R_{DS(ON)} < 42m\Omega @ V_{GS} = -4.5V$ TYP:34 m Ω
- Advanced Trench Technology
- Lead free product is acquired
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- $T_{jmax} = 175^{\circ}C$
- AEC-Q101 qualified

Application

- PWM applications
- Load Switch
- Power management



Schematic Diagram



Marking and pin Assignment

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
15P04Q-AU	AP15P04Q-AU	PDFN3X3	13 inch	-	5000

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_c = 25^{\circ}C$)	I_D	-15	A
Continuous Drain Current ($T_c = 100^{\circ}C$)	I_D	-10.5	A
Pulsed Drain Current ⁽¹⁾	I_{DM}	-60	A
Single Pulsed Avalanche Energy ⁽²⁾	E_{AS}	42	mJ
Power Dissipation	P_D	38	W
Thermal Resistance from Junction to Case	$R_{\theta JC}$	3.9	$^{\circ}C/W$
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	62	$^{\circ}C/W$
Junction Temperature	T_J	175	$^{\circ}C$
Storage Temperature	T_{STG}	-55~ +175	$^{\circ}C$

MOSFET ELECTRICAL CHARACTERISTICS(T_a=25°C unless otherwise noted)

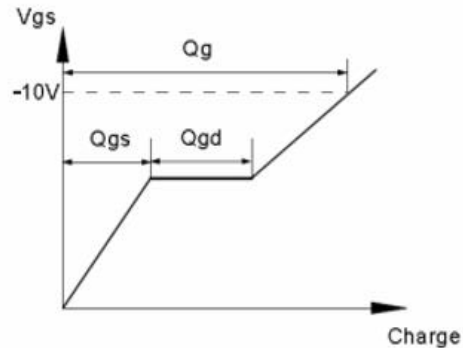
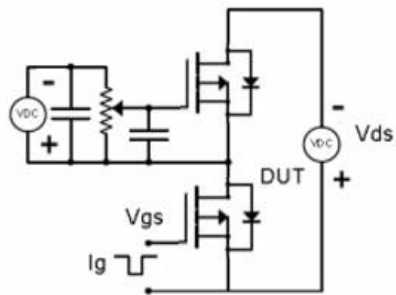
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = -250μA	-40	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} = -40V, V _{GS} = 0V	-	-	1	μA
Gate-body leakage current	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V	-	-	±100	nA
Gate threshold voltage ⁽³⁾	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-1	-1.5	-2.2	V
Drain-source on-resistance ⁽³⁾	R _{DS(on)}	V _{GS} = -10V, I _D = -15A	-	27	33	mΩ
		V _{GS} = -4.5V, I _D = -10A	-	34	42	
Dynamic characteristics						
Input Capacitance	C _{iss}	V _{DS} = -20V, V _{GS} = 0V, f = 1MHz	-	1512	-	pF
Output Capacitance	C _{oss}		-	115	-	
Reverse Transfer Capacitance	C _{rss}		-	104	-	
Switching characteristics						
Turn-on delay time	t _{d(on)}	V _{DD} = -20V, I _D = -15A, V _{GS} = -10V, R _G = 2.5Ω	-	4	-	ns
Turn-on rise time	t _r		-	27.5	-	
Turn-off delay time	t _{d(off)}		-	39.4	-	
Turn-off fall time	t _f		-	10.4	-	
Total Gate Charge	Q _g	V _{DS} = -20V, I _D = -8A, V _{GS} = -10V	-	27.6	-	nC
Gate-Source Charge	Q _{gs}		-	4.4	-	
Gate-Drain Charge	Q _{gd}		-	5.4	-	
Source-Drain Diode characteristics						
Diode Forward voltage ⁽³⁾	V _{DS}	V _{GS} = 0V, I _S = -15A	-	-	-1.2	V
Diode Forward current ⁽⁴⁾	I _S		-	-	-15	A
Reverse Recovery Time	T _{rr}	V _{GS} = 0V, I _S = -15A, di/dt = 100A/μS	-	10.9	-	ns
Reverse Recovery Char	Q _{rr}		-	2.09	-	nC

Notes:

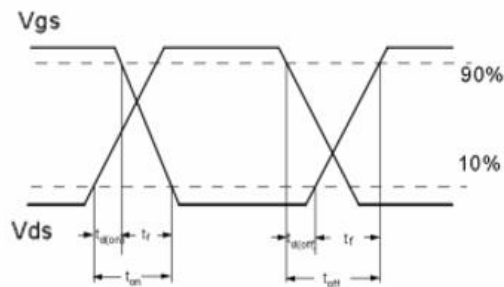
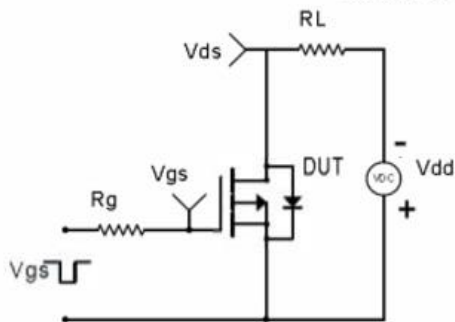
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition: T_J = 25°C, V_{DD} = -20V, R_G = 25 Ω, L = 0.5mH, I_{AS} = -13A
3. Pulse Test: pulse width ≤ 300μs, duty cycle ≤ 2%
4. Surface Mounted on FR4 Board, t ≤ 10 sec

Test Circuit & Waveform

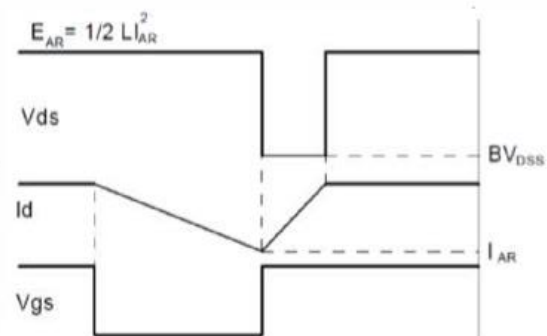
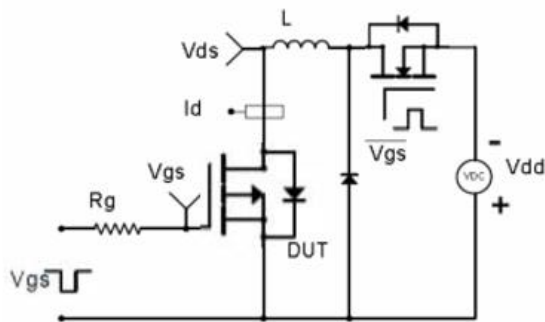
Gate Charge Test Circuit & Waveform



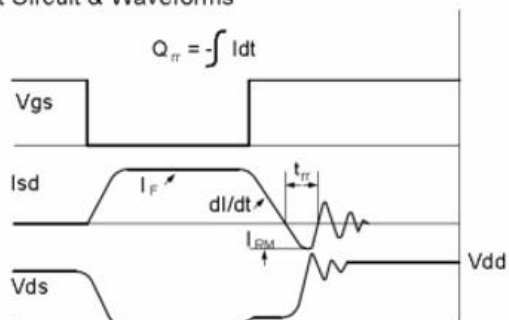
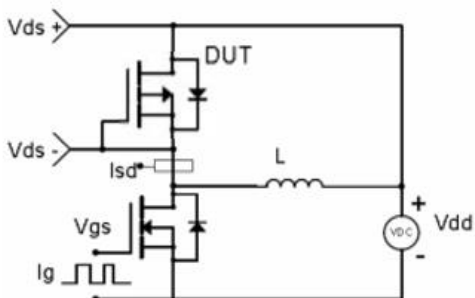
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Typical Performance Characteristics

Fig1. Typical Output Characteristics@T_J= 125°C

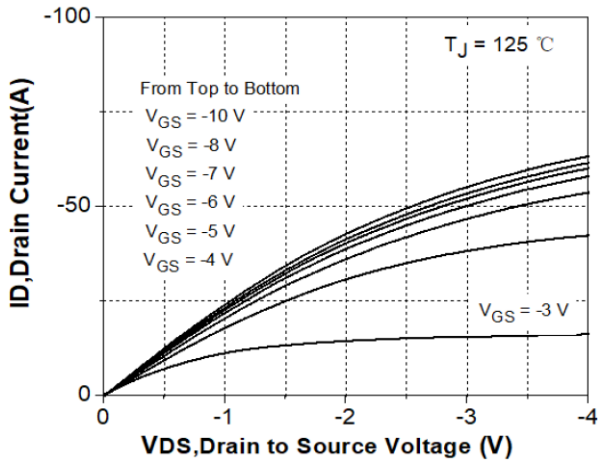


Fig2. Transconductance vs. Drain Current @T_J= -25/25/75/125°C

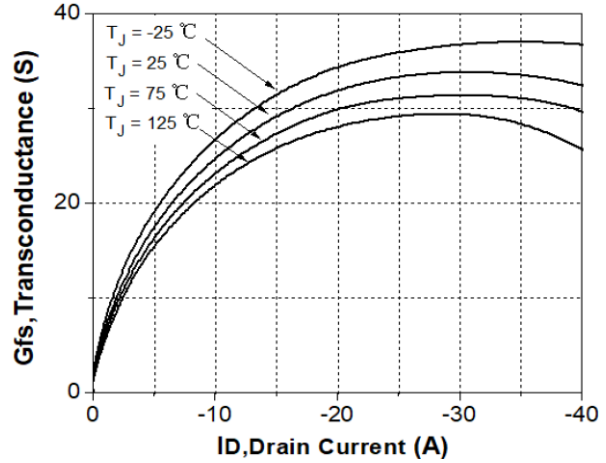


Fig3. Typical Transfer Characteristics @T_J= -25/25/75/125°C

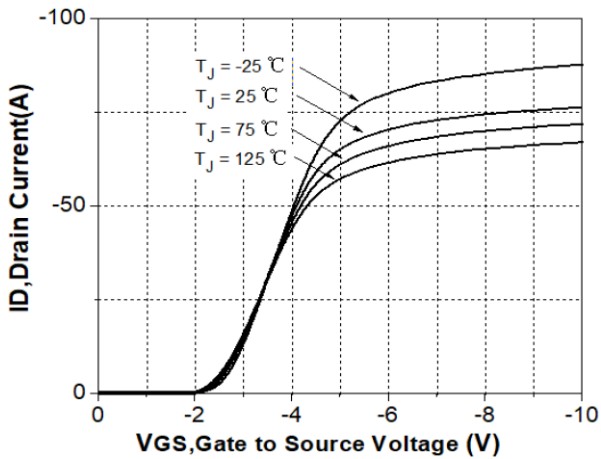


Fig4. Static Drain - Source On - State Resistance vs. Drain Current @T_J= -25°C

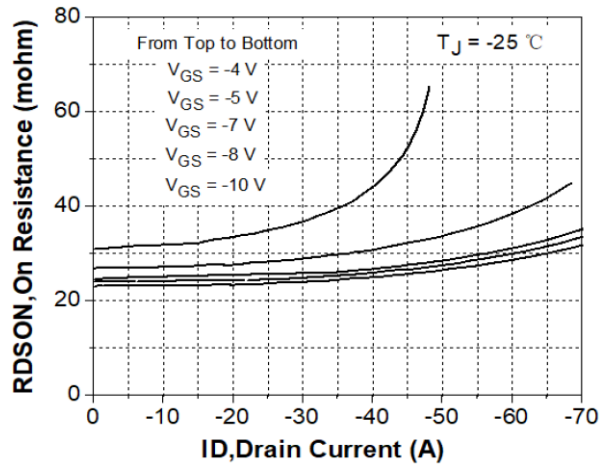


Fig5. Static Drain - Source On - State Resistance vs. Drain Current @T_J= 25°C

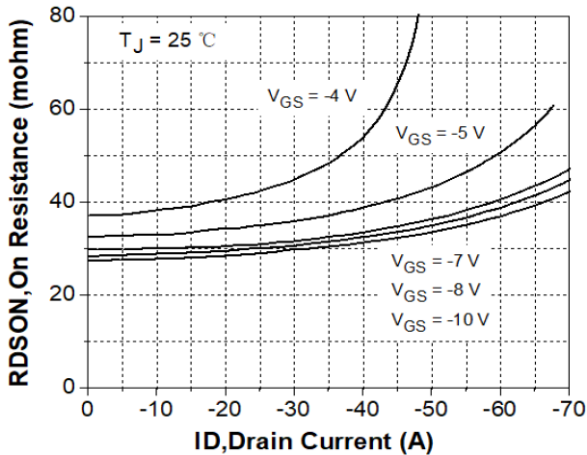


Fig6. Static Drain - Source On - State Resistance vs. Drain Current @T_J= 75°C

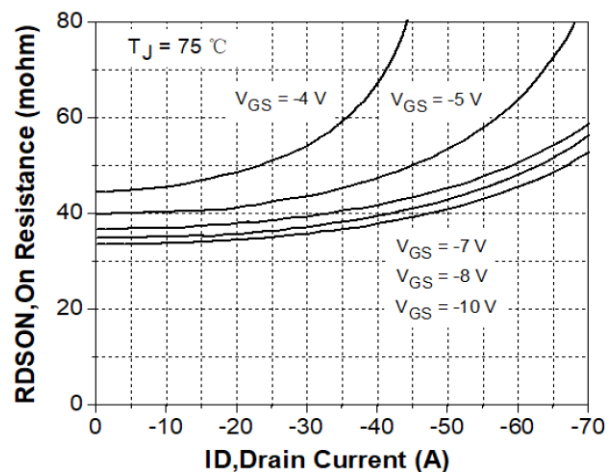


Fig7. Static Drain - Source On - State Resistance vs. Drain Current @Tj= 125°C

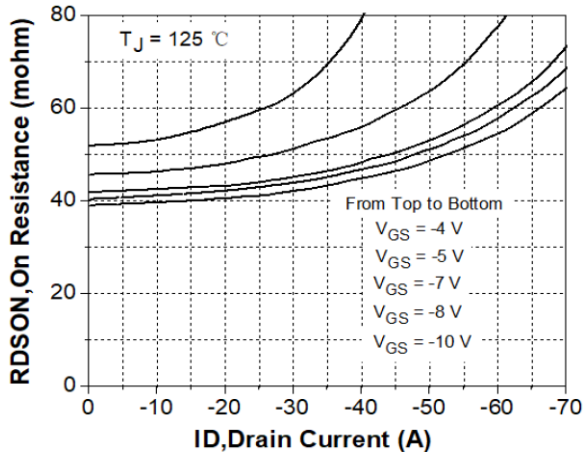


Fig8. Gate Charge Characteristics

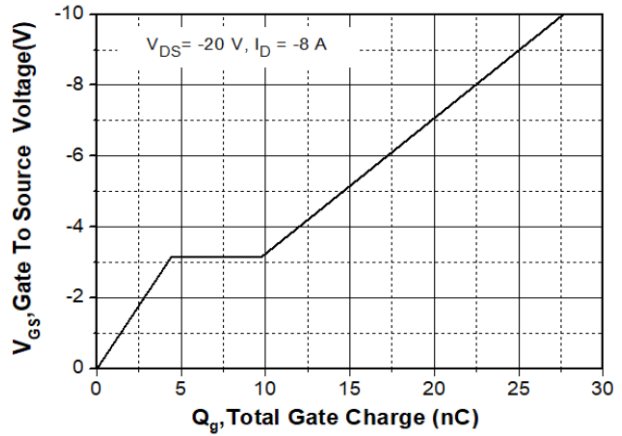


Fig9. Breakdown Voltage vs. Junction Temperature

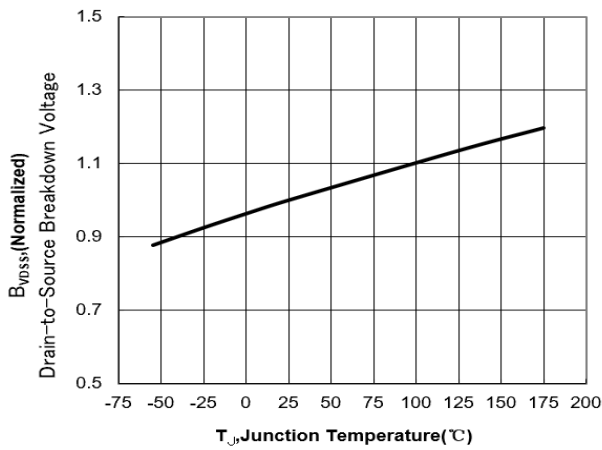


Fig10. Gate Threshold Voltage vs. Junction Temperature

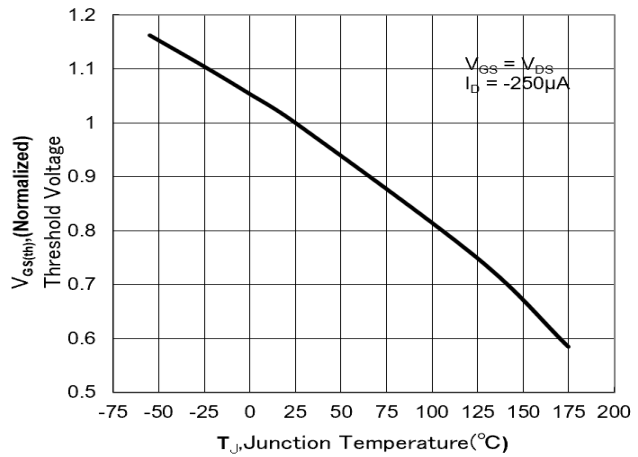


Fig11. On-Resistance Variation vs. Junction Temperature

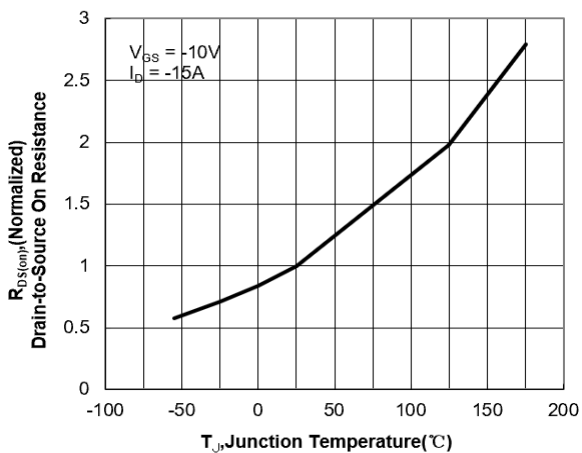


Fig12. Maximum Drain Current vs. Case Temperature

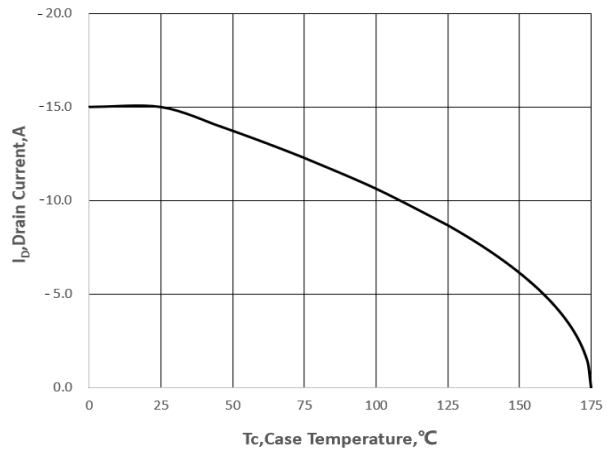


Fig13. Body Diode Forward Voltage vs. Reverse Drain Current

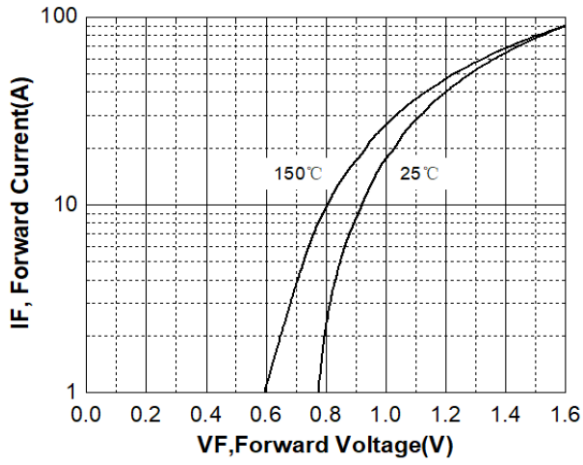


Fig14. Typical Output Characteristics @Tj= 25°C

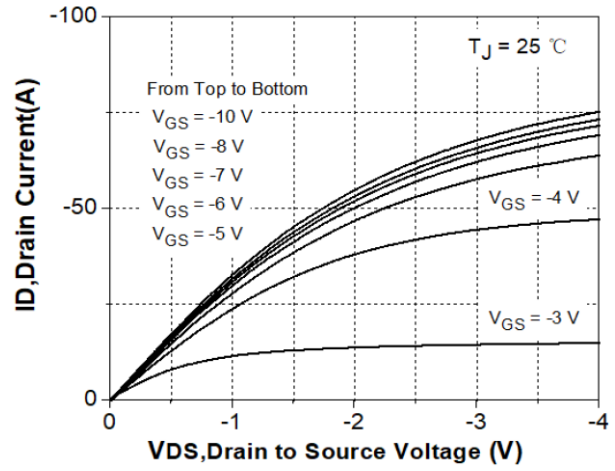


Fig15. Safe Operating Area

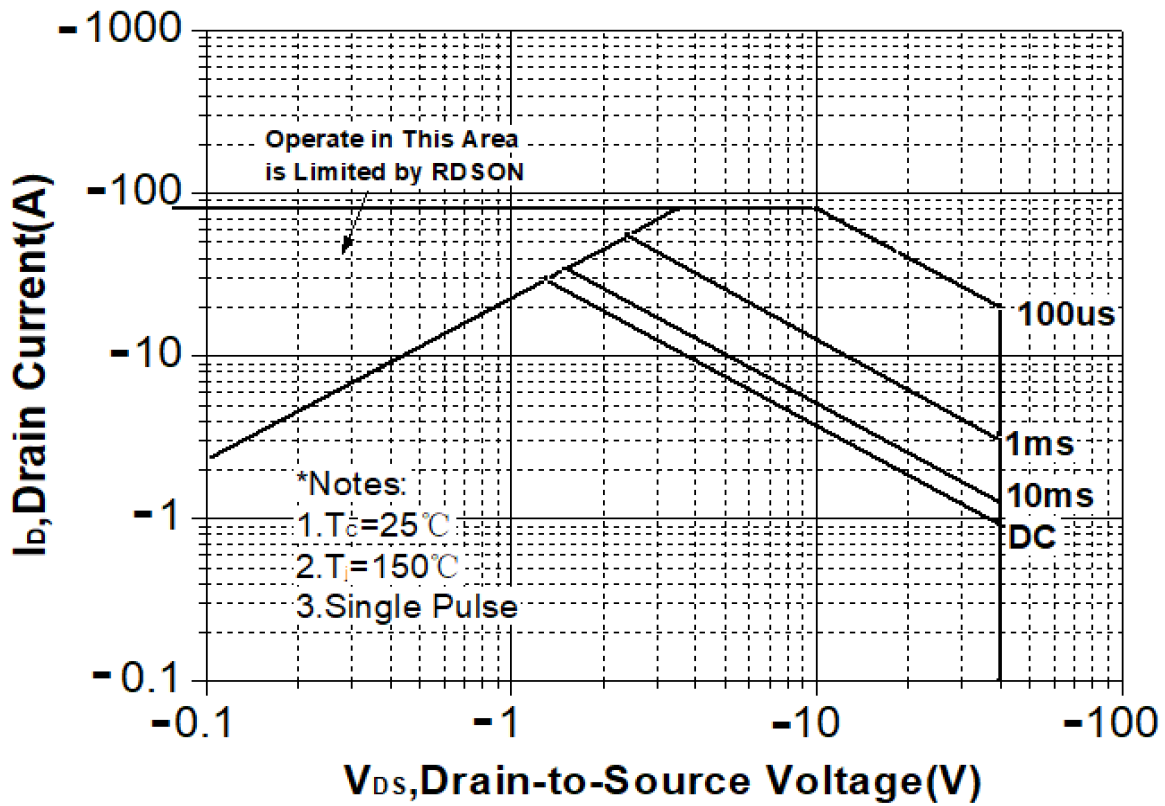
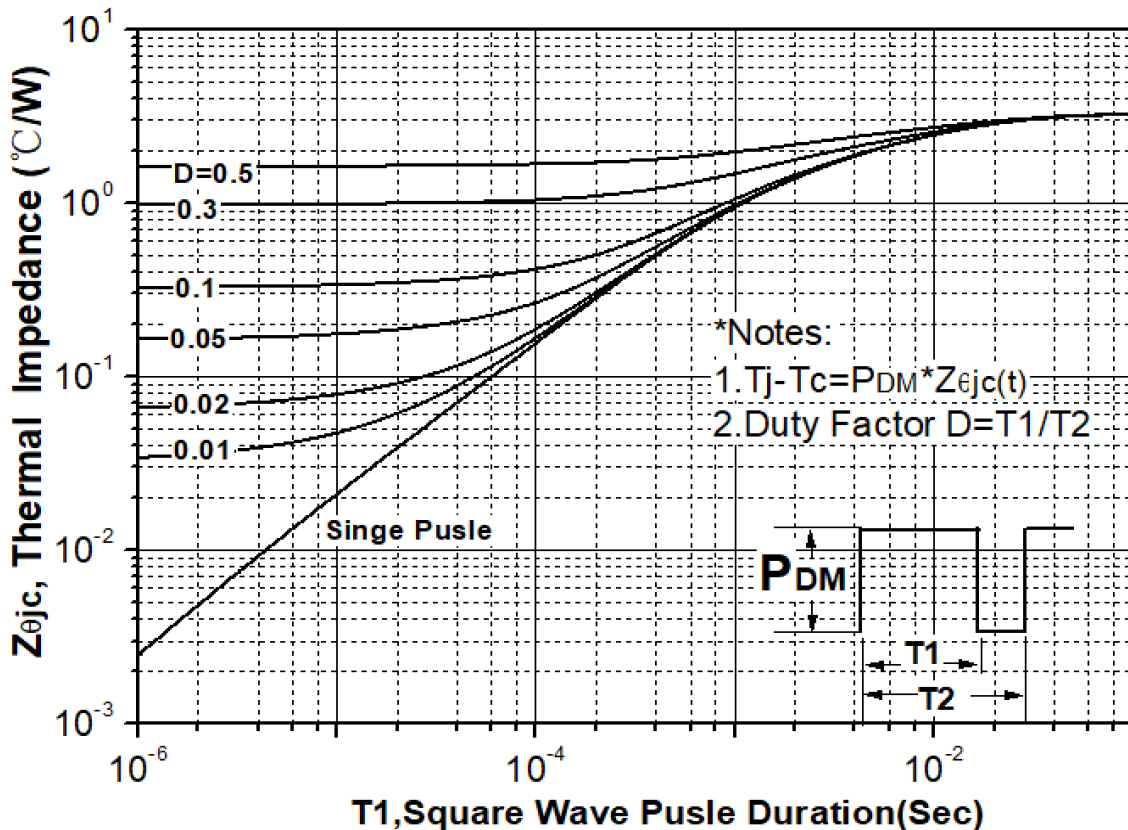
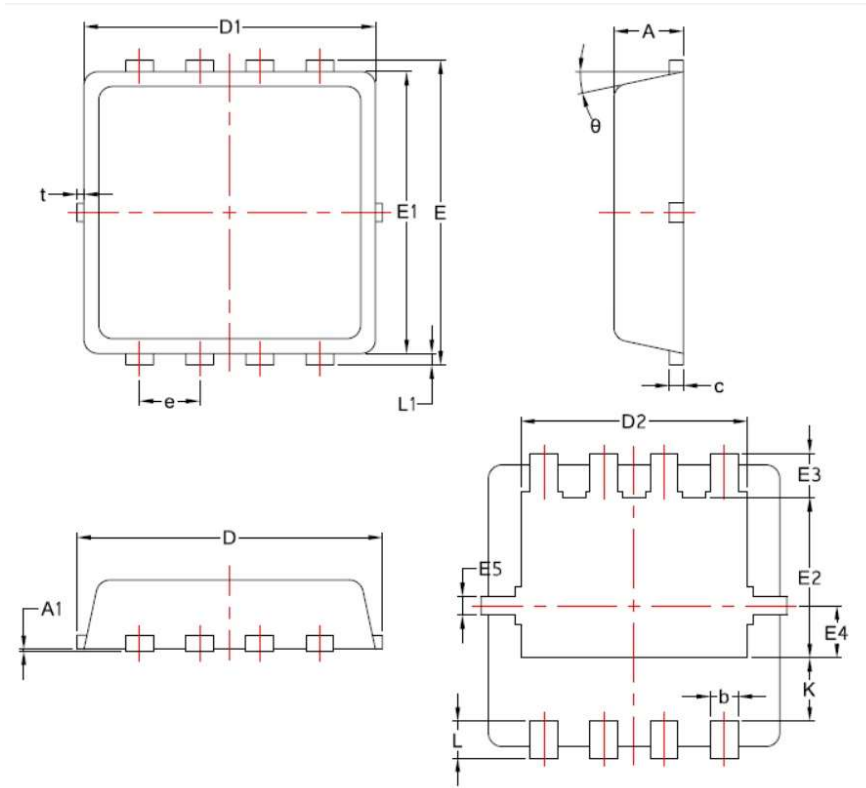


Fig16. Transient Thermal Response Curve



PDFN3X3 Package Information



SYMBOL	COMMON		
	MM		
	MIN	NOM	MAX
A	0.70	0.75	0.85
A1	/	/	0.05
b	0.20	0.30	0.40
c	0.10	0.152	0.25
D	3.15	3.30	3.45
D1	3.00	3.15	3.25
D2	2.29	2.45	2.65
E	3.15	3.30	3.45
E1	2.90	3.05	3.20
E2	1.54	1.74	1.94
E3	0.28	0.48	0.65
E4	0.37	0.57	0.77
E5	0.10	0.20	0.30
e	0.60	0.65	0.70
K	0.59	0.69	0.89
L	0.30	0.40	0.50
L1	0.06	0.125	0.20
t	0	0.075	0.13
θ	10°	12°	14°