

AP2045Q

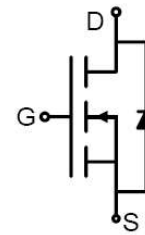
N-Channel Enhancement Mosfet

AIIPOWER

DATA SHEET

Feature

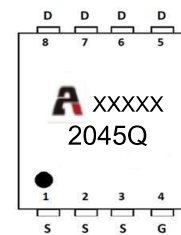
- 20V,60A
 $R_{DS(ON)} < 5.2m\Omega @ V_{GS}=4.5V$ TYP=4.3 m Ω
 $R_{DS(ON)} < 7.8m\Omega @ V_{GS}=2.5V$ TYP=7.8 m Ω
- Advanced Trench Technology
- Lead free product is acquired
- Excellent $R_{DS(ON)}$ and Low Gate Charge



Schematic Diagram

Application

- PWM applications
- Load Switch
- Power management



Marking and pin Assignment

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
2045Q	AP2045Q	PDFN3X3-8L	13 inch	-	5000

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current ($T_a=25^\circ\text{C}$)	I_D	60	A
Continuous Drain Current ($T_a=100^\circ\text{C}$)	I_D	40	A
Pulsed Drain Current ⁽¹⁾	I_{DM}	200	A
Singel Pulsed Avalanche Energy ⁽²⁾	E_{AS}	60	mJ
Power Dissipation	P_D	30	W
Thermal Resistance from Junction to Case ⁽⁴⁾	$R_{\theta JC}$	3.2	$^\circ\text{C}/\text{W}$
Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55~ +150	$^\circ\text{C}$

MOSFET ELECTRICAL CHARACTERISTICS($T_a=25^{\circ}\text{C}$ unless otherwise noted)

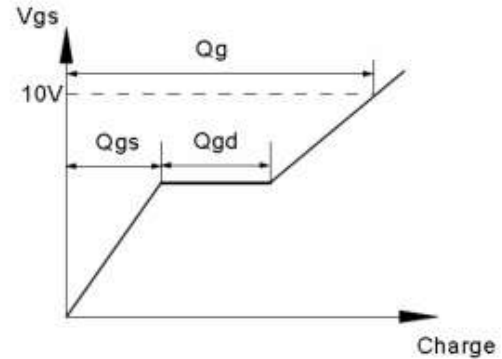
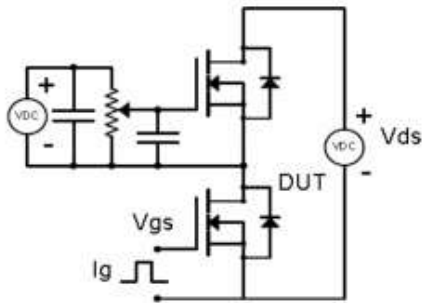
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	20	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 20V, V_{GS} = 0V$	-	-	1	μA
Gate-body leakage current	I_{GSS}	$V_{GS} = \pm 12V, V_{DS} = 0V$	-	-	± 100	nA
Gate threshold voltage ⁽³⁾	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	0.5	0.7	0.9	V
Drain-source on-resistance ⁽³⁾	$R_{DS(on)}$	$V_{GS} = 4.5V, I_D = 30A$	-	4.3	5.2	m Ω
		$V_{GS} = 2.5V, I_D = 20A$	-	5.8	7.8	
Dynamic characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 10V, V_{GS} = 0V, f = 1MHz$	-	1832	-	pF
Output Capacitance	C_{oss}		-	289	-	
Reverse Transfer Capacitance	C_{rss}		-	271	-	
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 10V, I_D = 25A,$ $V_{GS} = 4.5V, R_G = 1.8\Omega$	-	15	-	ns
Turn-on rise time	t_r		-	37	-	
Turn-off delay time	$t_{d(off)}$		-	52	-	
Turn-off fall time	t_f		-	21	-	
Total Gate Charge	Q_g	$V_{DS} = 10V, I_D = 25A,$ $V_{GS} = 4.5V$	-	23	-	nC
Gate-Source Charge	Q_{gs}		-	4.5	-	
Gate-Drain Charge	Q_{gd}		-	7.3	-	
Source-Drain Diode characteristics						
Diode Forward voltage ⁽³⁾	V_{DS}	$V_{GS} = 0V, I_S = 25A$	-	-	1.2	V
Diode Forward current ⁽⁴⁾	I_S		-	-	60	A

Notes:

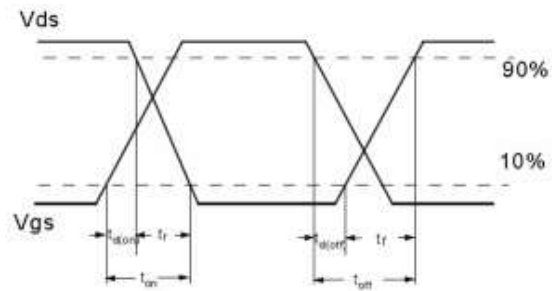
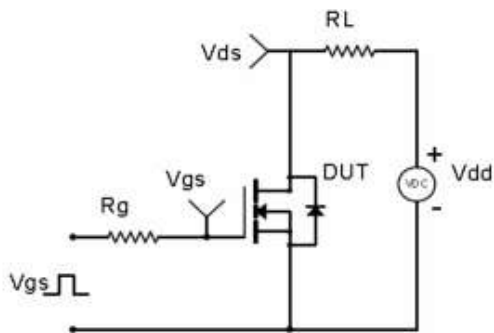
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition: $T_J = 25^{\circ}\text{C}, V_{DD} = 15V, R_G = 25\Omega, L = 0.5\text{mH}$
3. Pulse Test: pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$
4. Surface Mounted on FR4 Board, $t \leq 10\text{ sec}$

Test Circuit & Waveform

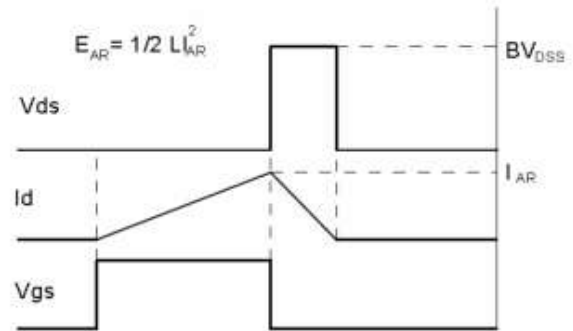
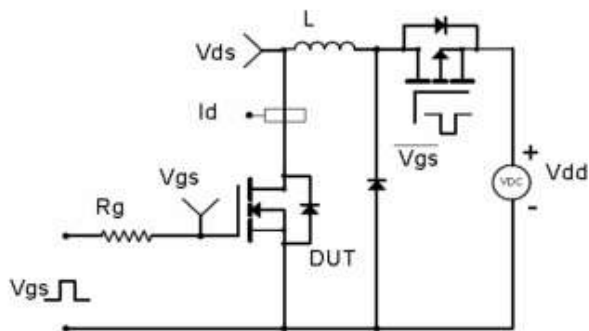
Gate Charge Test Circuit & Waveform



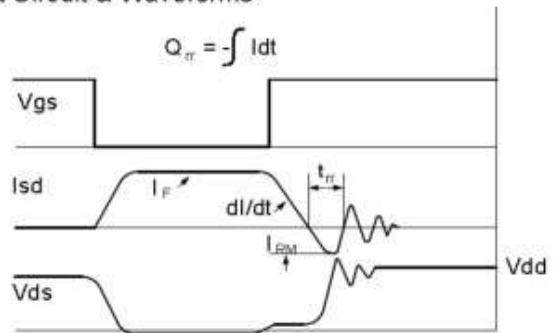
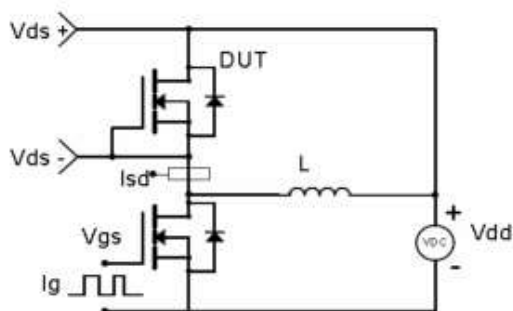
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Typical Performance Characteristics

Figure 1: Output Characteristics

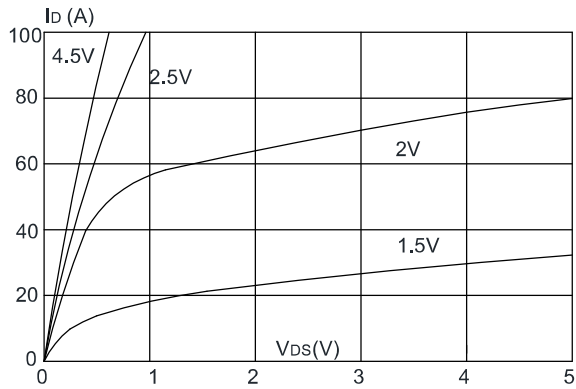


Figure 2: Typical Transfer Characteristics

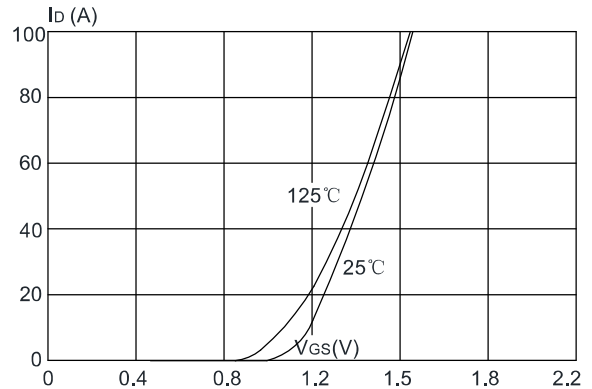


Figure 3: On-resistance vs. Drain Current

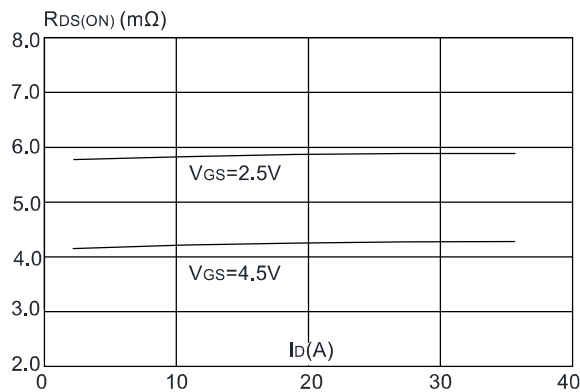


Figure 4: Body Diode Characteristics

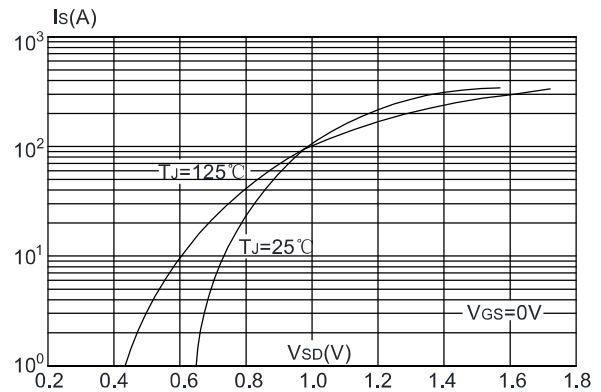


Figure 5: Gate Charge Characteristics

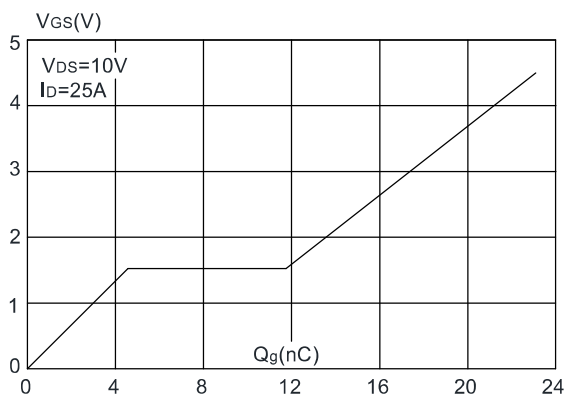


Figure 6: Capacitance Characteristics

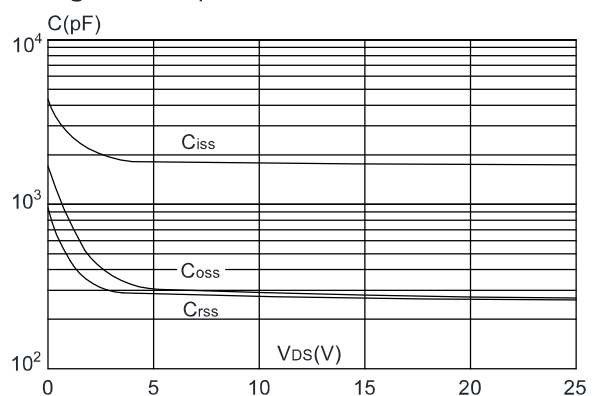


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

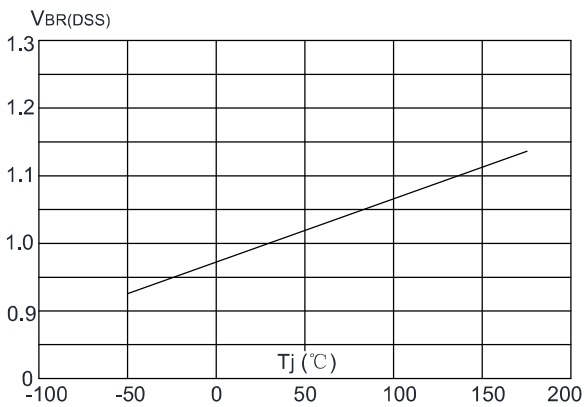


Figure 8: Normalized on Resistance vs. Junction Temperature

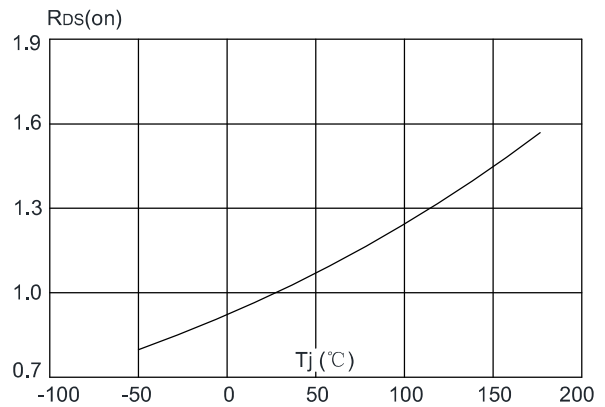


Figure 9: Maximum Safe Operating Area

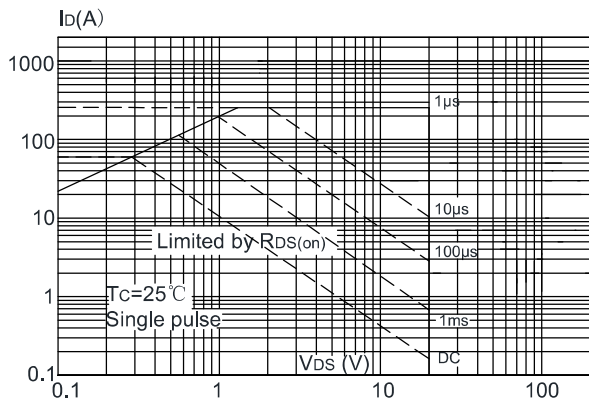


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

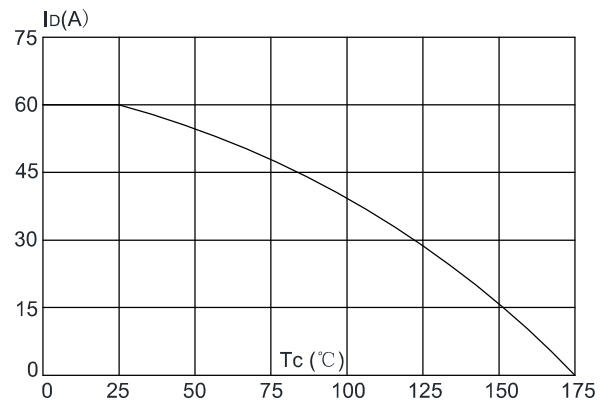
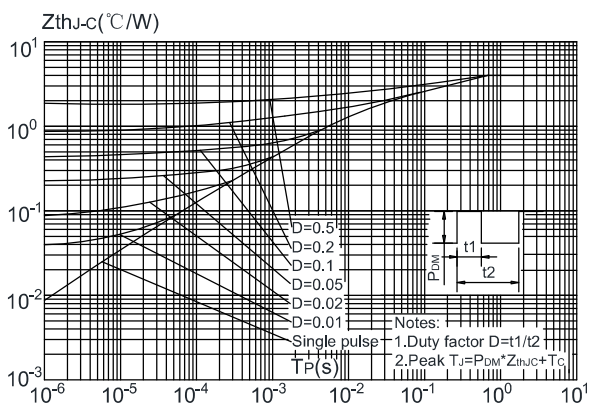
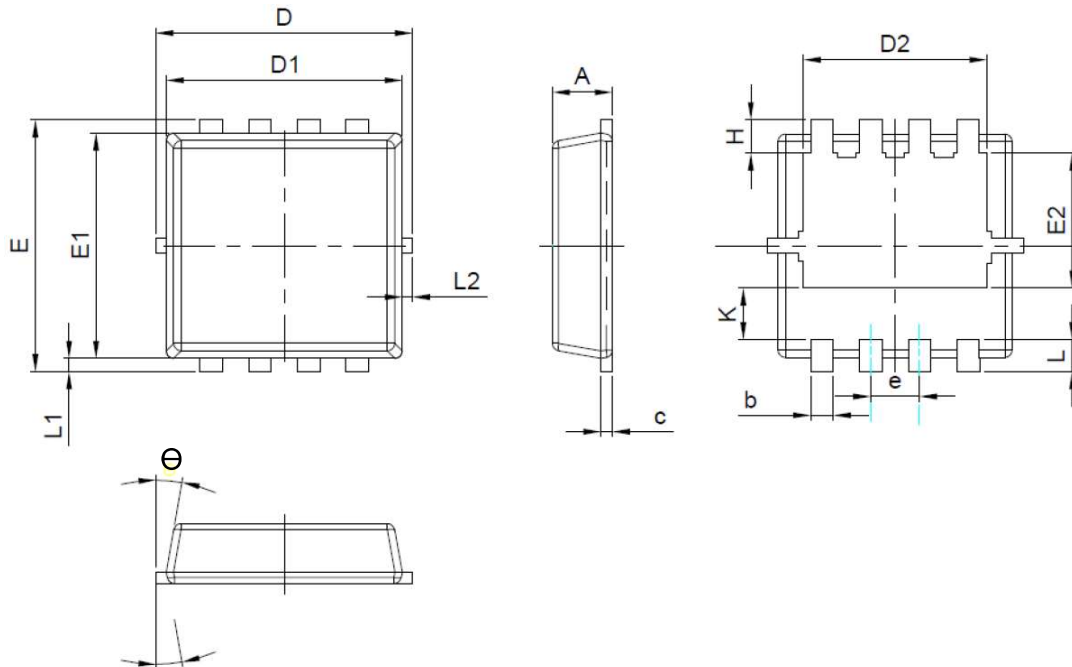


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



PDFN3X3-8L Package Information



COMMON DIMENSIONS
(UNITS OF MEASURE = MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.70	0.80	0.90
b	0.25	0.30	0.39
c	0.14	0.15	0.25
D	3.20	3.30	3.40
D1	3.00	3.15	3.30
D2	2.35	2.45	2.55
e	0.65 BSC		
E	3.25	3.35	3.45
E1	2.85	3.00	3.15
E2	1.635	1.735	1.835
H	0.33	0.48	0.63
K	0.585	0.685	0.785
L	0.30	0.40	0.50
L1	0.05	0.15	0.25
L2	-	-	0.15
θ	8°	10°	12°