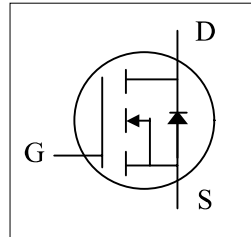


# AP2045Q

## N-Channel Power MOSFET

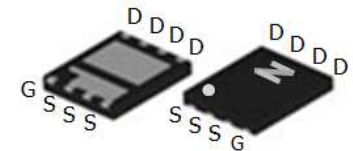
- ▼ Capable of 2.5V Gate Drive
- ▼ Small Size & Ultra\_Low  $R_{DS(ON)}$
- ▼ RoHS Compliant & Halogen-Free



$BV_{DSS}$	20V
$R_{DS(ON)}$	4.6m $\Omega$
$I_D^3$	65A

### Description

AP2045Q series are from Advanced Power innovated design and silicon process technology to achieve the lowest possible on-resistance and fast switching performance. It provides the designer with an extreme efficient device for use in a wide range of power applications.



DFN3 x 3

### Absolute Maximum Ratings@ $T_j=25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D@T_A=25^\circ\text{C}$	Drain Current, $V_{GS} @ 4.5V^3$	65	A
$I_D@T_A=70^\circ\text{C}$	Drain Current, $V_{GS} @ 4.5V^3$	40	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	140	A
$P_D@T_A=25^\circ\text{C}$	Total Power Dissipation	35	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

### Thermal Data

Symbol	Parameter	Value	Unit
Rthj-c	Maximum Thermal Resistance, Junction-case	5	$^\circ\text{C}/\text{W}$
Rthj-a	Maximum Thermal Resistance, Junction-ambient <sup>3</sup>	40	$^\circ\text{C}/\text{W}$

## N-Channel Power MOSFET

Electrical Characteristics@T<sub>j</sub>=25°C(unless otherwise specified)

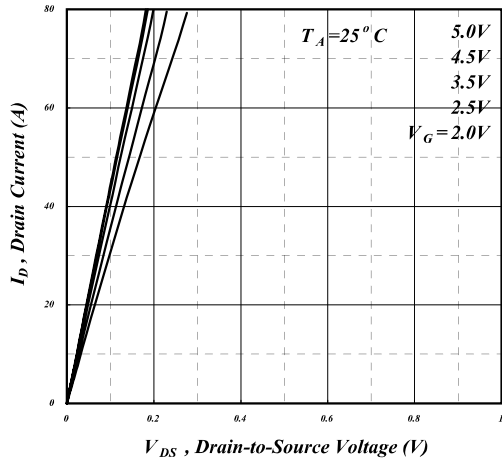
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	20	-	-	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A	-	4.6	5.5	mΩ
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =12A	-	-	7	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =1mA	0.6	-	0.9	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =20A	-	130	-	S
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =16V, V <sub>GS</sub> =0V	-	-	10	uA
I <sub>GSS</sub>	Gate-Source Leakage	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V	-	-	±100	nA
Q <sub>g</sub>	Total Gate Charge	I <sub>D</sub> =20A	-	62	99.2	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =10V	-	4	-	nC
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	V <sub>GS</sub> =4.5V	-	21	-	nC
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DS</sub> =10V	-	12	-	ns
t <sub>r</sub>	Rise Time	I <sub>D</sub> =1A	-	20	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time	R <sub>G</sub> =3.3Ω	-	100	-	ns
t <sub>f</sub>	Fall Time	V <sub>GS</sub> =5V	-	80	-	ns
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V	-	3600	4400	pF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> =10V	-	500	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance	f=1.0MHz	-	400	-	pF
R <sub>g</sub>	Gate Resistance	f=1.0MHz	-	1.4	2.8	Ω

## Source-Drain Diode

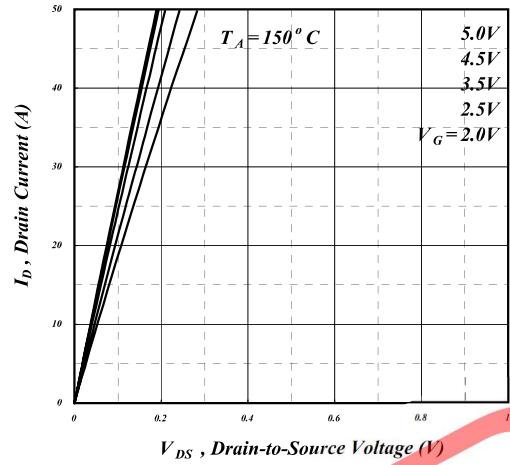
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V <sub>SD</sub>	Forward On Voltage <sup>2</sup>	I <sub>S</sub> =2.5A, V <sub>GS</sub> =0V	-	-	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>S</sub> =20A, V <sub>GS</sub> =0V,	-	43	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge	di/dt=100A/μs	-	26	-	nC

## Notes:

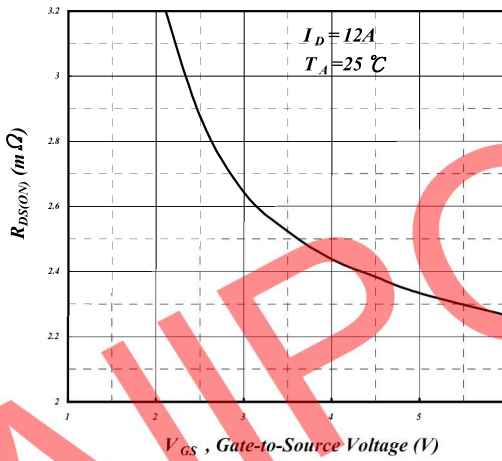
- 1.Pulse width limited by Max. junction temperature.
- 2.Pulse test
- 3.Surface mounted on 1 in<sup>2</sup> 2oz copper pad of FR4 board, t ≤10sec; 135°C/W when mounted on min. copper pad.
- 4.Maximum current limited by package.



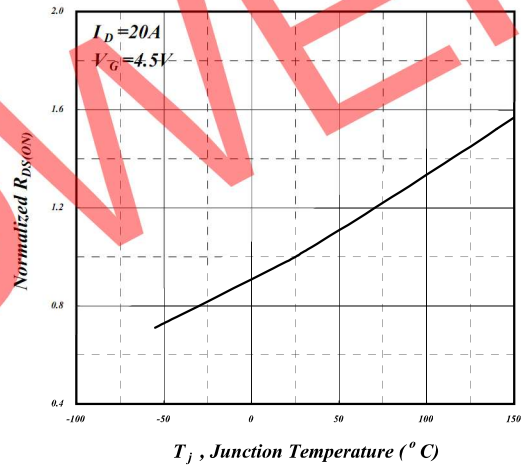
**Fig 1. Typical Output Characteristics**



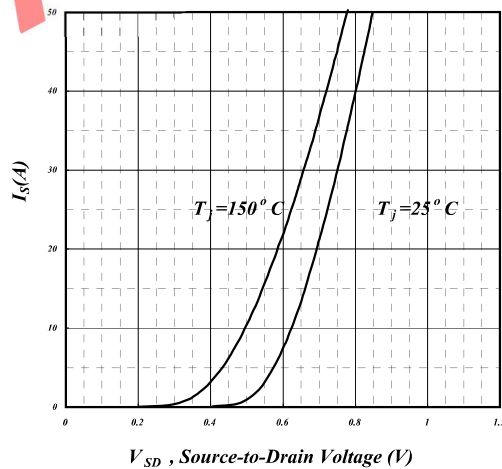
**Fig 2. Typical Output Characteristics**



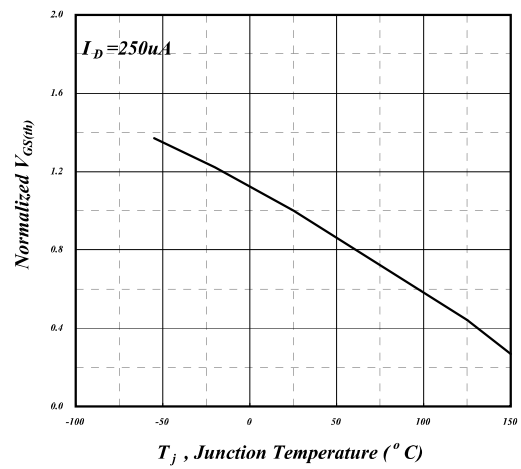
**Fig 3. On-Resistance v.s. Gate Voltage**



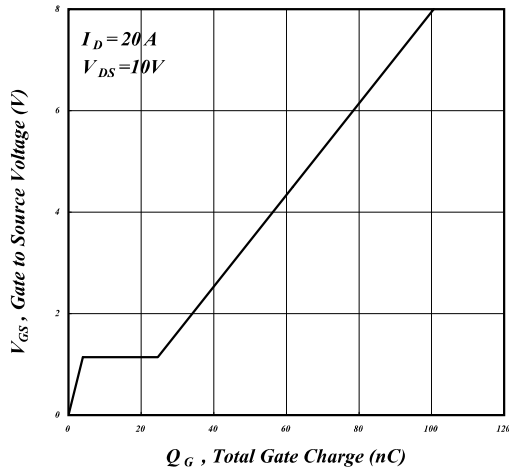
**Fig 4. Normalized On-Resistance v.s. Junction Temperature**



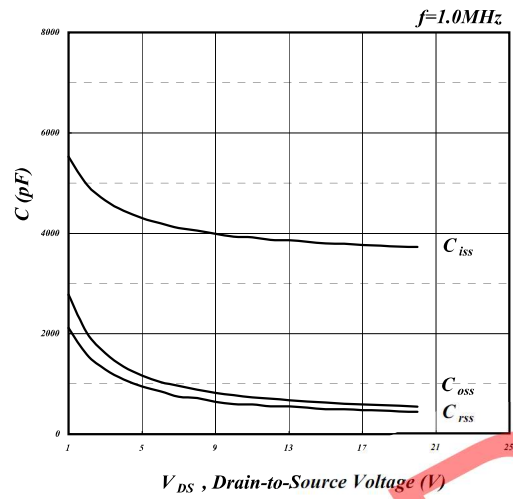
**Fig 5. Forward Characteristic of Reverse Diode**



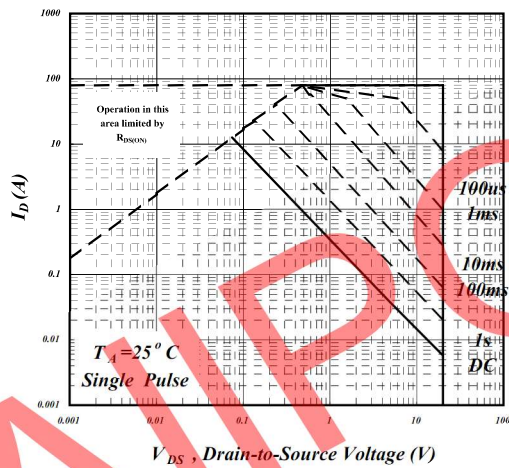
**Fig 6. Gate Threshold Voltage v.s. Junction Temperature**



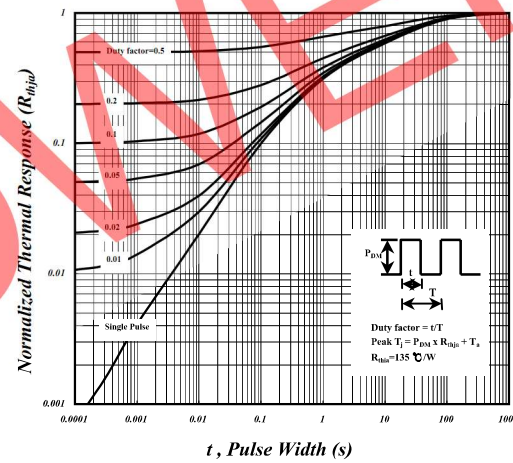
**Fig 7. Gate Charge Characteristics**



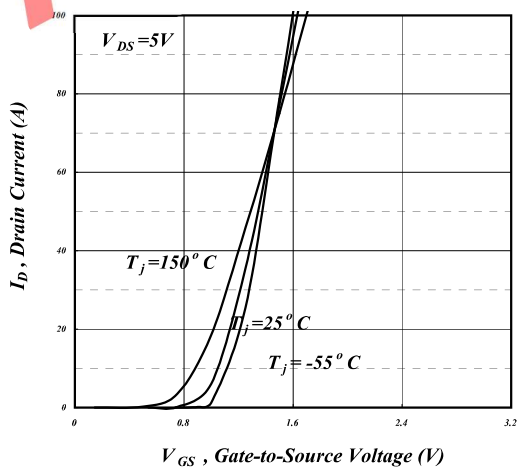
**Fig 8. Typical Capacitance Characteristics**



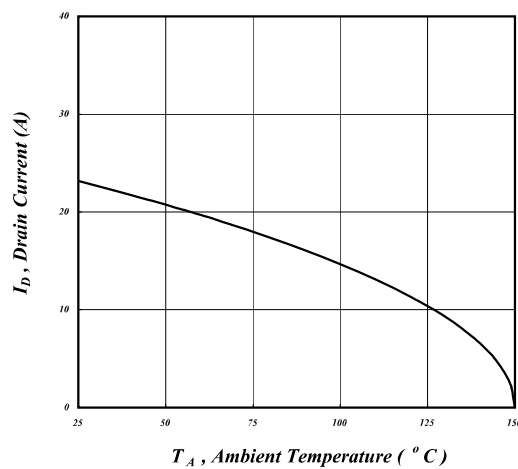
**Fig 9. Maximum Safe Operating Area**



**Fig 10. Effective Transient Thermal Impedance**



**Fig 11. Transfer Characteristics**



**Fig 12. Drain Current v.s. Ambient Temperature**

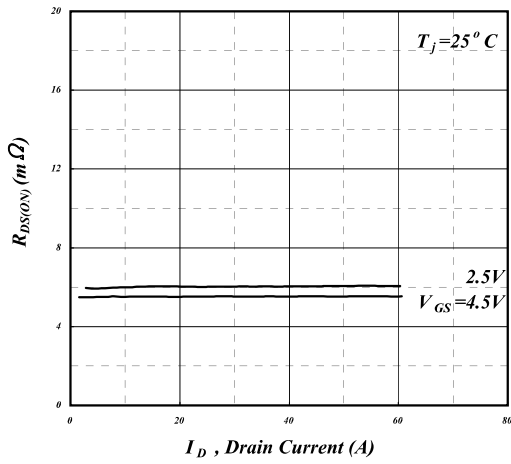


Fig 13. Typ. Drain-Source on State Resistance

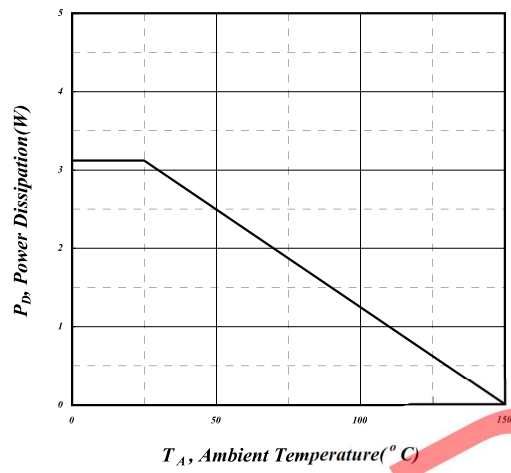
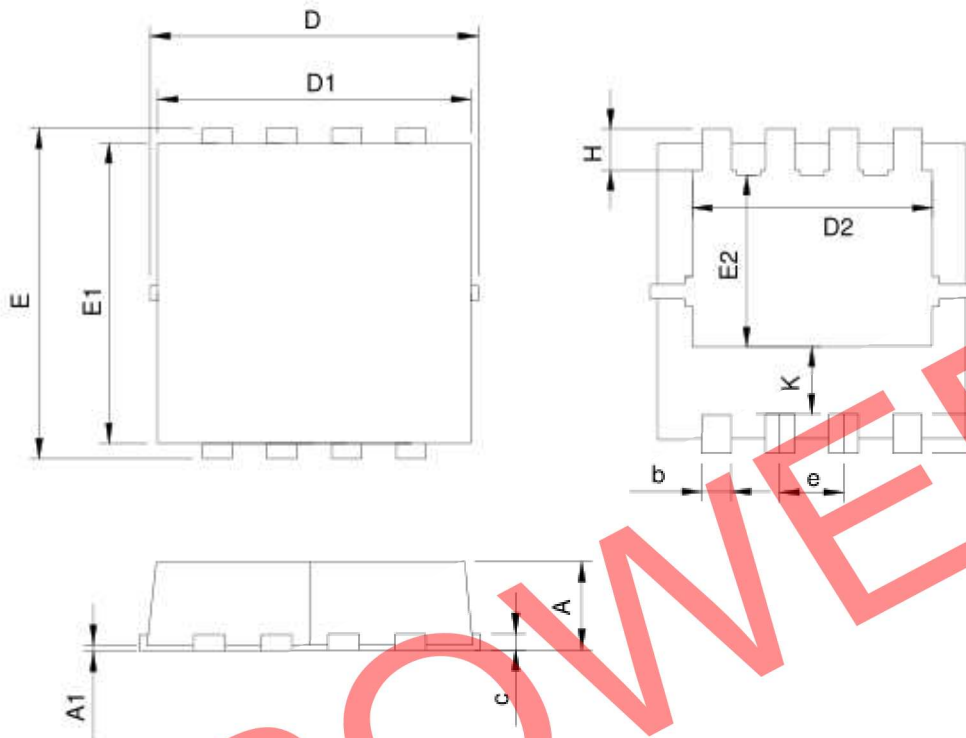


Fig 14. Total Power Dissipation

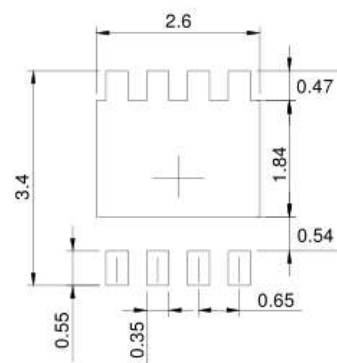
AIPPOWER

•Dimensions(DFN3×3)



Symbol	DFN3.3x3.3-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.70	1.00	0.028	0.039
A1	0.00	0.05	0.000	0.002
b	0.25	0.35	0.010	0.014
c	0.14	0.20	0.006	0.008
D	3.10	3.50	0.122	0.138
D1	3.05	3.25	0.120	0.128
D2	2.35	2.55	0.093	0.100
E	3.10	3.50	0.122	0.138
E1	2.90	3.10	0.114	0.122
E2	1.64	1.84	0.065	0.072
e	0.65 BSC		0.026 BSC	
H	0.32	0.52	0.013	0.020
K	0.59	0.79	0.023	0.031
L	0.25	0.55	0.010	0.022

RECOMMENDED LAND PATTERN



UNIT: mm