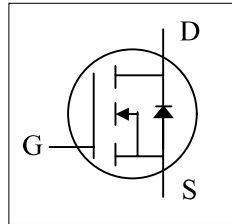


# AP0903Q

## N-Channel Power MOSFET

- ▼ Simple Drive Requirement
- ▼ Good Thermal Dissipation
- ▼ Low On-resistance
- ▼ RoHS Compliant & Halogen-Free

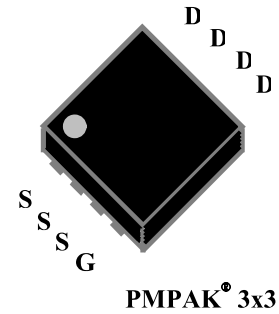


$BV_{DSS}$	30V
$R_{DS(ON)}$	9m $\Omega$
$I_D$	20A

### Description

Advanced Power MOSFETs from AP provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The PMPAK<sup>®</sup> 3 x 3 package is special for DC-DC converters application and lower 1.0mm profile with backside heat sink.



### Absolute Maximum Ratings@T<sub>j</sub>=25°C(unless otherwise specified)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_A=25^\circ C$	Drain Current <sup>3</sup> , $V_{GS}$ @ 10V	20	A
$I_D@T_A=70^\circ C$	Drain Current <sup>3</sup> , $V_{GS}$ @ 10V	14.1	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	75	A
$E_{AS}$	Single Pulse Avalanche Energy <sup>4</sup>	65	mJ
$P_D@T_A=25^\circ C$	Total Power Dissipation	20	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

### Thermal Data

Symbol	Parameter	Value	Units
Rthj-a	Maximum Thermal Resistance, Junction-ambient <sup>3</sup>	6.25	$^\circ C/W$

**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	30	-	-	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =10A	-	-	9	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =8A	-	-	16	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	1	-	3	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =10V, I <sub>D</sub> =10A	-	24	-	S
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V	-	-	10	uA
	Drain-Source Leakage Current (T <sub>j</sub> =70°C)	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V	-	-	250	uA
I <sub>GSS</sub>	Gate-Source Leakage	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
Q <sub>g</sub>	Total Gate Charge <sup>2</sup>	I <sub>D</sub> =10A	-	13	22	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =15V	-	4.4	-	nC
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	V <sub>GS</sub> =4.5V	-	5	-	nC
t <sub>d(on)</sub>	Turn-on Delay Time <sup>2</sup>	V <sub>DS</sub> =15V	-	10	-	ns
t <sub>r</sub>	Rise Time	I <sub>D</sub> =1A	-	7	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time	R <sub>G</sub> =6Ω	-	24	-	ns
t <sub>f</sub>	Fall Time	V <sub>GS</sub> =10V	-	8	-	ns
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V	-	790	1280	pF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> =25V	-	225	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance	f=1.0MHz	-	160	-	pF
R <sub>g</sub>	Gate Resistance	f=1.0MHz	-	1.8	-	Ω

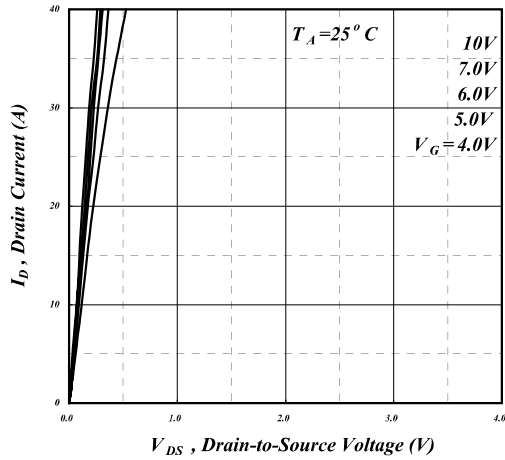
**Source-Drain Diode**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V <sub>SD</sub>	Forward On Voltage <sup>2</sup>	I <sub>S</sub> =2.9A, V <sub>GS</sub> =0V	-	-	1.2	V
t <sub>rr</sub>	Reverse Recovery Time <sup>2</sup>	I <sub>S</sub> =10A, V <sub>GS</sub> =0V,	-	27	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge	di/dt=100A/μs	-	20	-	nC

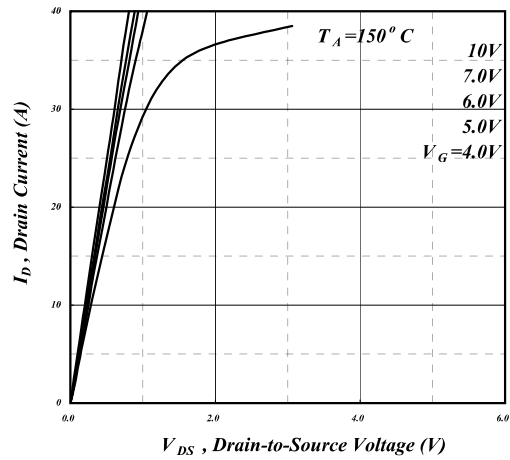
**Notes:**

- 1.Pulse width limited by Max. junction temperature.
- 2.Pulse test
- 3.Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board, t ≤10sec
- 4.Starting T<sub>j</sub>=25°C , V<sub>DD</sub>=15V , L=0.5mH , R<sub>G</sub>=25Ω

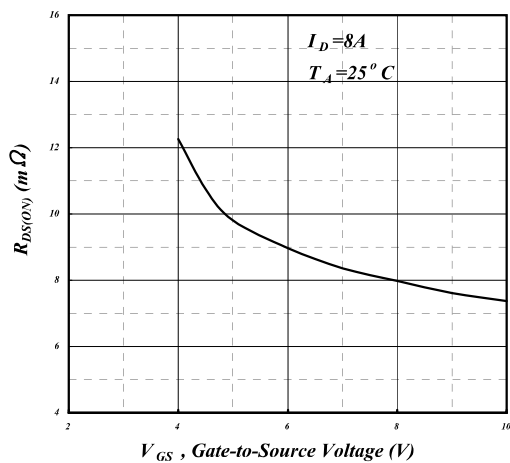
**N-Channel Power MOSFET**



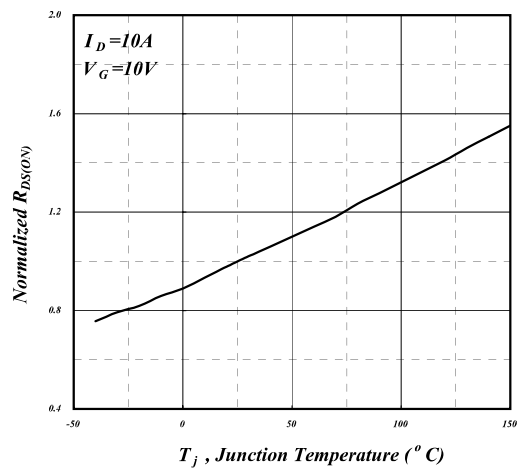
**Fig 1. Typical Output Characteristics**



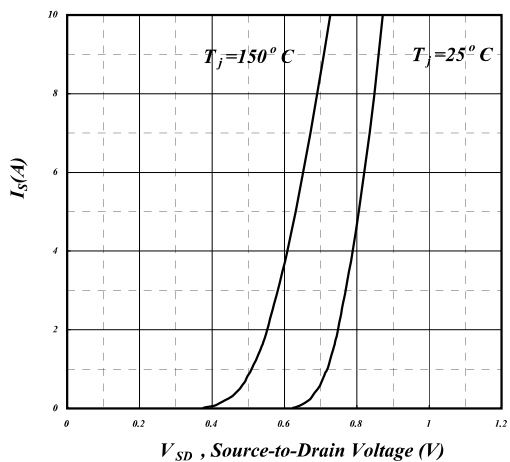
**Fig 2. Typical Output Characteristics**



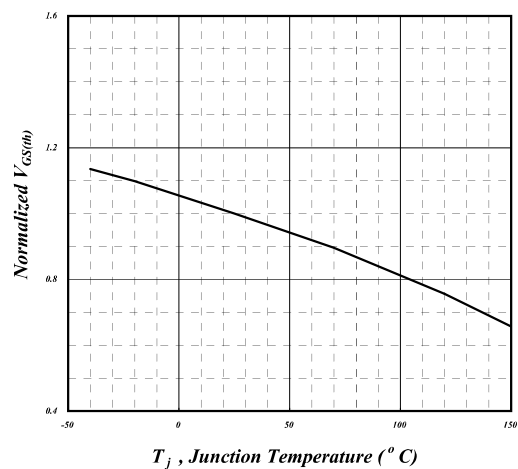
**Fig 3. On-Resistance v.s. Gate Voltage**



**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**

**N-Channel Power MOSFET**

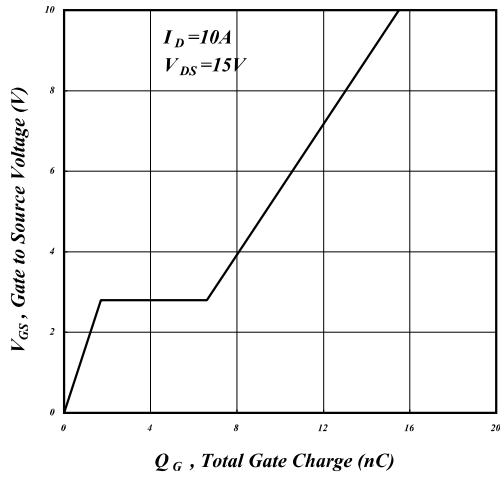


Fig 7. Gate Charge Characteristics

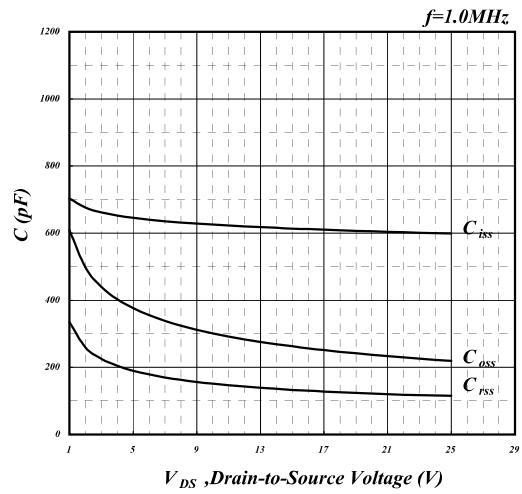


Fig 8. Typical Capacitance Characteristics

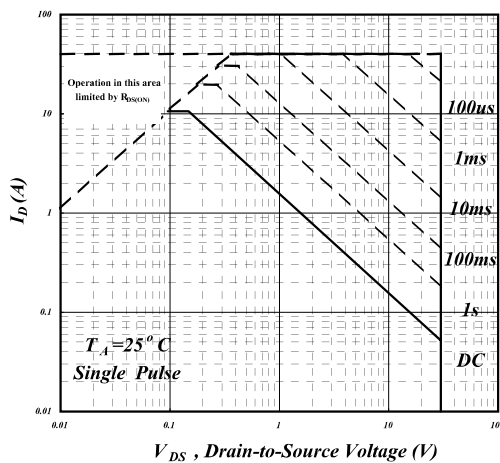


Fig 9. Maximum Safe Operating Area

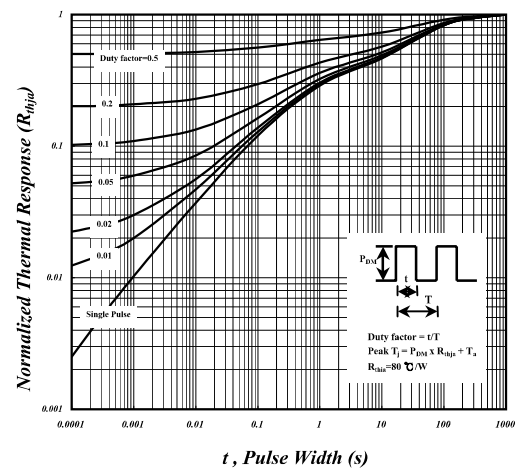


Fig 10. Effective Transient Thermal Impedance

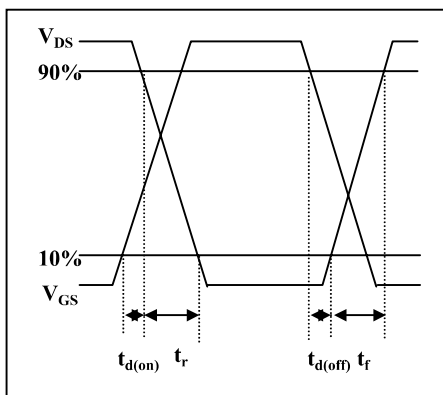


Fig 11. Switching Time Waveform

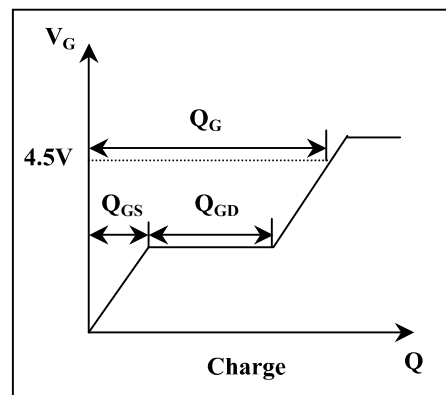
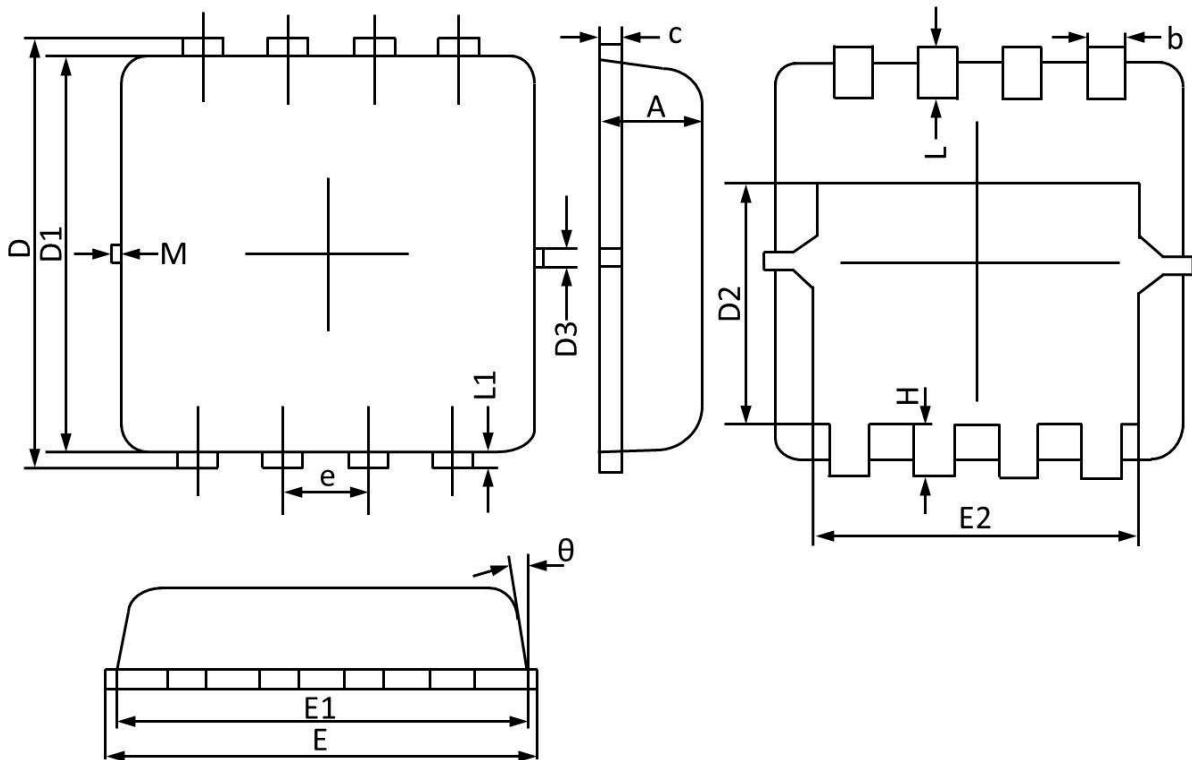


Fig 12. Gate Charge Waveform

PPAK3x3 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.700	0.800	0.028	0.031
b	0.250	0.350	0.010	0.013
c	0.100	0.250	0.004	0.009
D	3.250	3.450	0.128	0.135
D1	3.000	3.200	0.119	0.125
D2	1.780	1.980	0.070	0.077
D3	0.130 REF		0.005 REF	
E	3.200	3.400	0.126	0.133
E1	3.000	3.200	0.119	0.125
E2	2.390	2.590	0.094	0.102
e	0.650 BSC		0.026 BSC	
H	0.300	0.500	0.011	0.019
L	0.300	0.500	0.011	0.019
L1	0.130 REF		0.005 REF	
θ	0°	12°	0°	12°
M	0.150 REF		0.006 REF	