

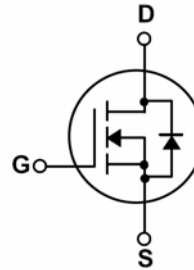
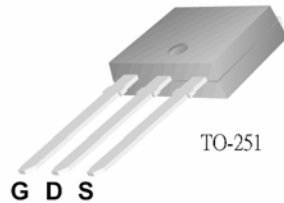
#### 1 Description

These N-Channel enhancement mode power field effect transistors are produced using planar stripe, DMOS technology.

This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switched mode power supplies, active power factor correction based on half bridge topology.

#### 2 Features

- 600V / 1.8A
- $R_{DS(on)} = 4.6\Omega$ (typ)  $V_{GS} = 10V$ ,  $I_D = 1.08A$
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability..



#### 3 Absolute Maximum Ratings $T_C = 25^\circ C$ unless otherwise noted

Symbol	Parameter	apQ1HSN60AA	Units
$V_{DSS}$	Drain-Source Voltage	600	V
$I_D$	Drain Current - Continuous ( $T_C = 25^\circ C$ )	1.8	A
$I_{DM}$	Drain Current – Pulsed ①	7.2	A
$V_{GS}$	Gate-Source Voltage	$\pm 30$	V
$E_{AS}$	Single Pulsed Avalanche Energy ②	50	mJ
$I_{AR}$	Avalanche Current	1.8	A
$E_{AR}$	Repetitive Avalanche Energy	4.2	mJ
dv/dt	Peak Diode Recovery dv/dt ③	20	V/ns
$P_D$	Power Dissipation ( $T_C = 25^\circ C$ ) -De-rate above $25^\circ C$	44	W
		0.35	W/ $^\circ C$
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +150	$^\circ C$
$T_L$	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	$^\circ C$

\* note :

- ① Repetitive Rating: Pulse width limited by maximum junction temperature.
- ②  $V_{DD} = 50V$ , starting  $T_J = 25^\circ C$ ,  $L = T_{BD}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 1.8A$
- ③  $I_{SD} \leq 1.8A$ ,  $di/dt \leq 200A/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 150^\circ C$ .



# DEVICE SPECIFICATION

apQ1HSN60AA

600V/1.8A N-Channel MOSFET

## 4 Thermal Characteristics

Symbol	Parameter	apQ01SN60AA	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	2.87	$^{\circ}\text{C}/\text{W}$
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink Typ.	50	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	110	$^{\circ}\text{C}/\text{W}$

## 5 Electrical Characteristics $T_C = 25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	600	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$ , Referenced to $25^{\circ}\text{C}$	--	0.6	--	$\text{V}/^{\circ}\text{C}$
$I_{DSS}$	Gate to Source leakage current	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$	--	--	20	$\mu\text{A}$
$I_{GSSF}$	Gate-Body Leakage Current, Forward	$V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
$I_{GSSR}$	Gate-Body Leakage Current, Reverse	$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 0.9\text{A}$ ④	--	4.6	5.5	$\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 15\text{ V}, I_D = 0.9\text{A}$ ①	--	--	10	S
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}$	--	155	--	pF
$C_{oss}$	Output Capacitance		--	20	--	pF
$C_{rss}$	Reverse Transfer Capacitance		--	4.0	--	pF
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 300\text{ V}, I_D = 1.8\text{A}, R_G = 10\ \Omega, R_D = 300\ \Omega, V_{GS} = 10\text{V}$ ④	--	8.8	--	ns
$t_r$	Turn-On Rise Time		--	20	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	18	--	ns
$t_f$	Turn-Off Fall Time		--	23	--	ns
$Q_g$	Total Gate Charge	$V_{DS} = 300\text{ V}, I_D = 1.8\text{A}, V_{GS} = 10\text{ V}$ ④	--	7.6	--	nC
$Q_{gs}$	Gate-Source Charge		--	1.1	--	nC
$Q_{gd}$	Gate-Drain Charge		--	3.8	--	nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain-Source Diode Forward Current		--	--	1.8	A
$I_{SM}$	Maximum Pulsed Drain-Source Diode Forward Current		--	--	7.2	A
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 0.5\text{A}$	--	--	1.4	V



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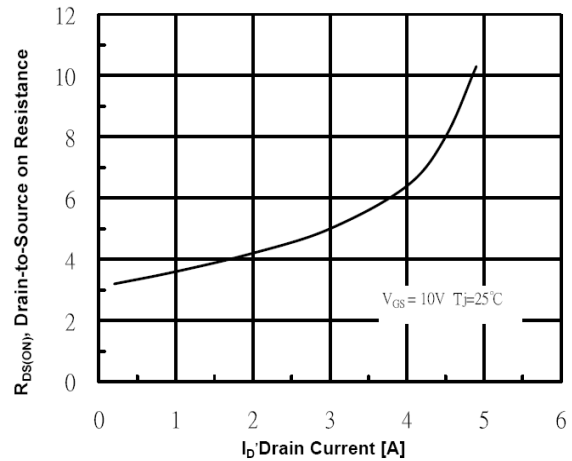
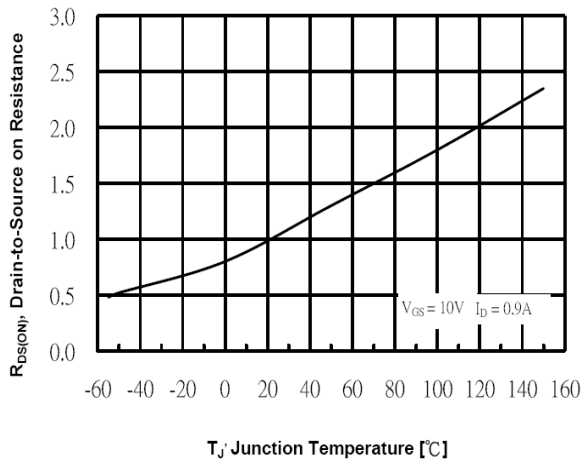
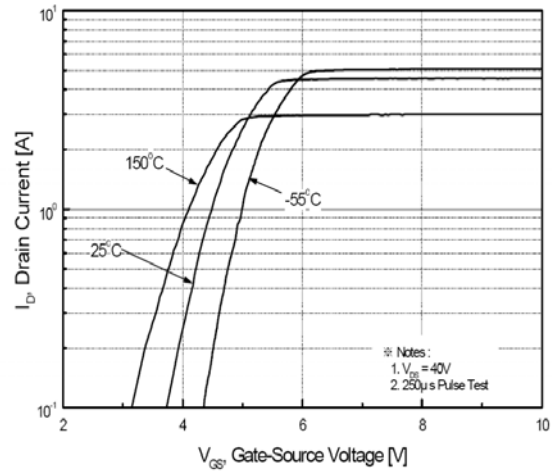
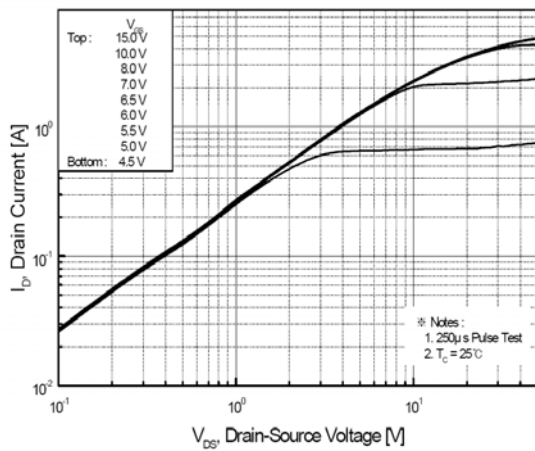
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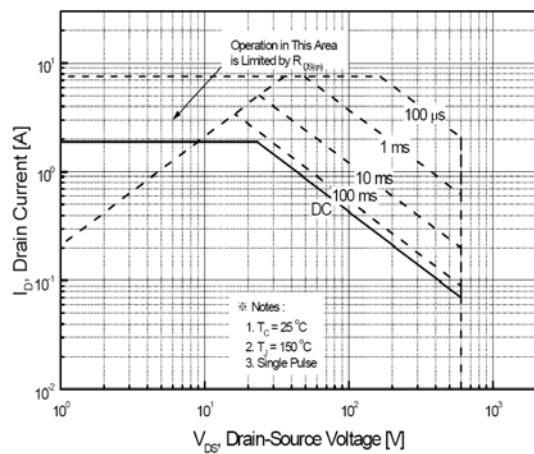
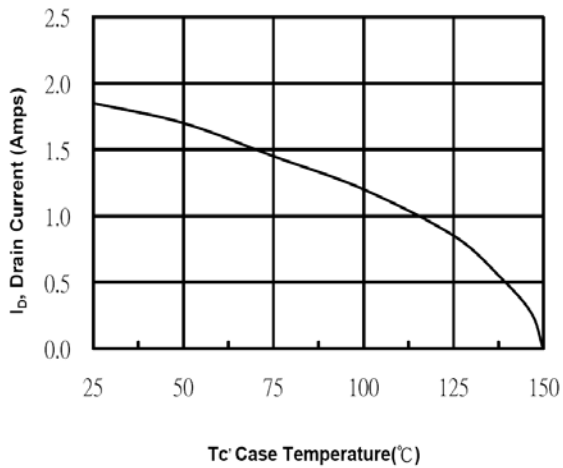
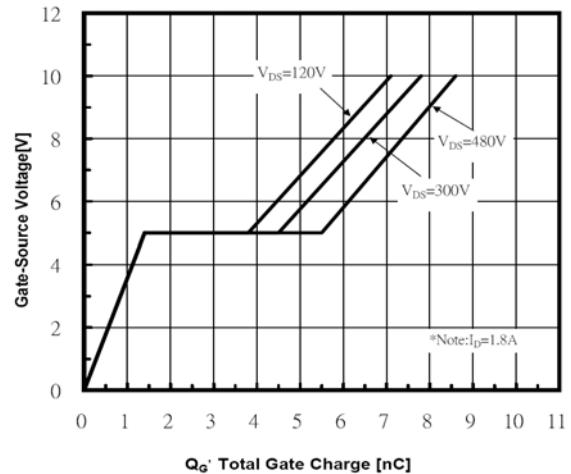
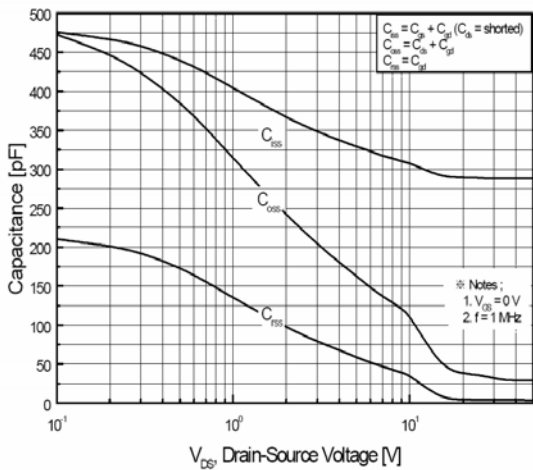
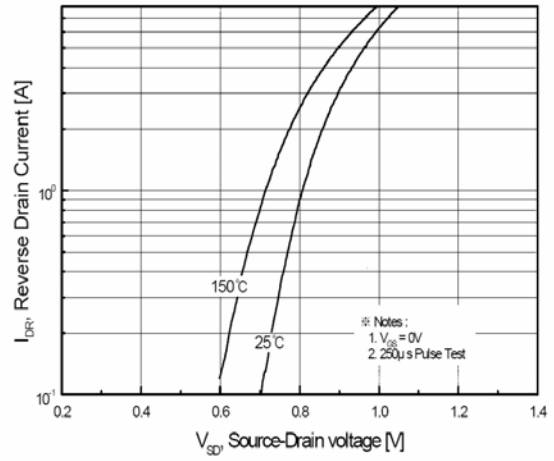
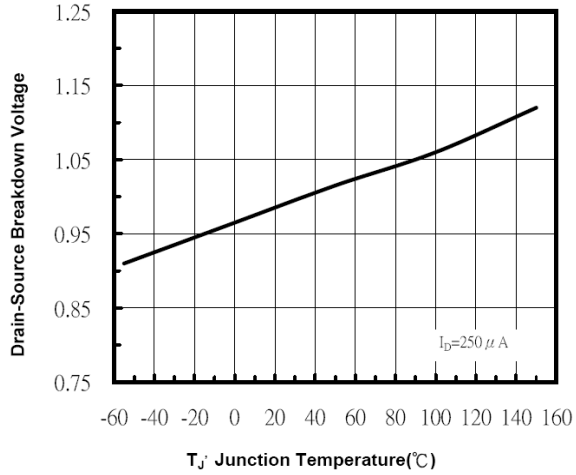
600V/1.8A N-Channel MOSFET

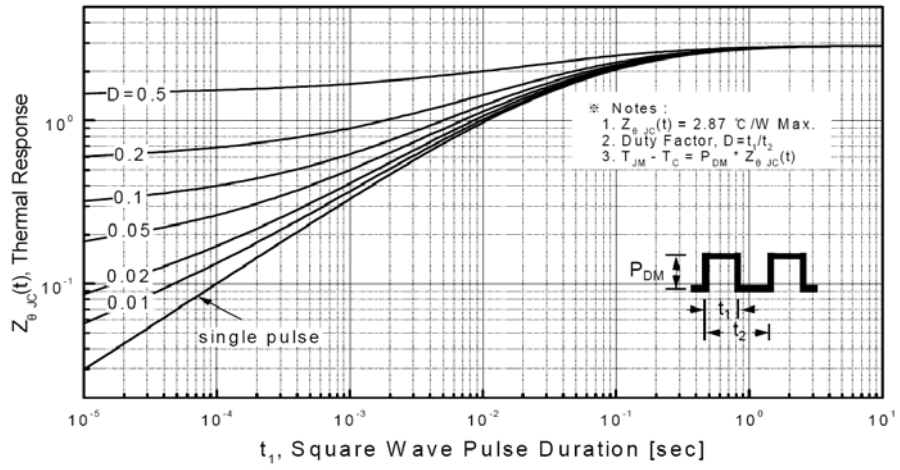
$t_{rr}$	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_F = 1.8\text{ A},$ $di_F/dt = 100\text{ A}/\mu\text{s}$ ④	--	220	--	ns
$Q_{rr}$	Reverse Recovery Charge		--	1.0	--	$\mu\text{C}$

**Notes:**

- ① Repetitive Rating: Pulse width limited by maximum junction temperature.
- ②  $V_{DD} = 50\text{V}$ , starting  $T_J = 25^\circ\text{C}$ ,  $L = \text{TBD}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 1.8\text{A}$
- ③  $I_{SD} \leq 1.8\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 150^\circ\text{C}$
- ④ Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$ .

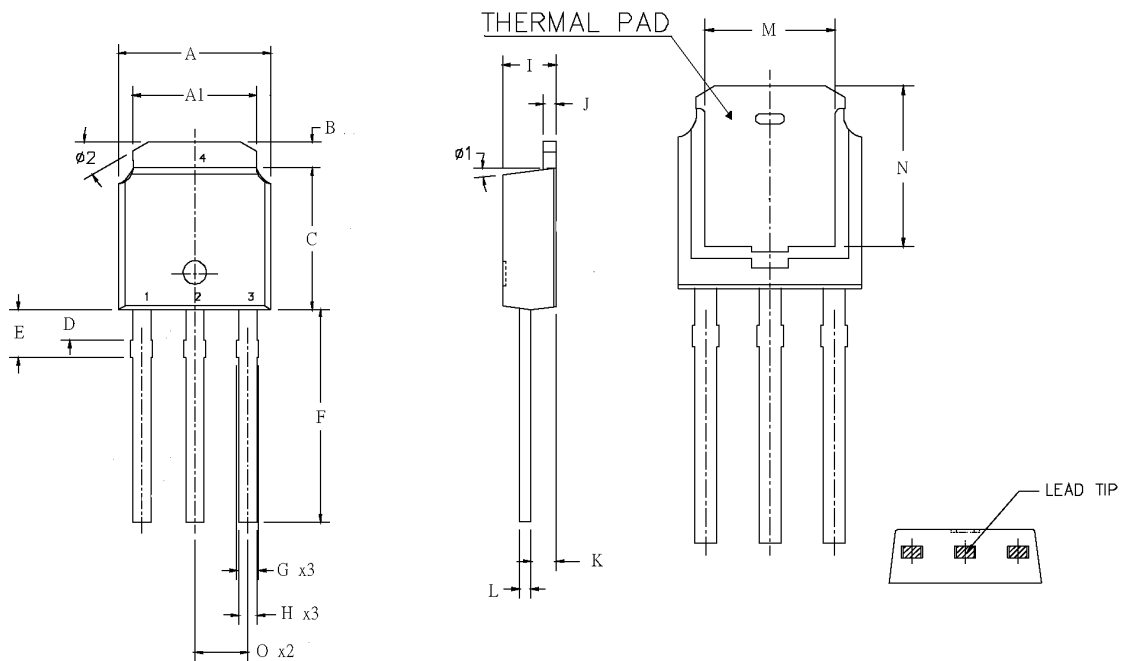






#### 6 Package Dimensions

#### TO-251



TO-251 DIMENSION							
DIM	MILLIMETERS						
	MIN	MAX	TYP.	DIM	MIN	MAX	TYP.
A	6.35	6.73	6.54	H	0.64	0.89	0.77
A1	4.95	5.46	5.21	I	2.18	2.39	2.29
B	0.89	1.27	1.08	J	0.46	0.89	0.66
C	5.97	6.22	6.10	K	0.89	1.14	1.02
D	1.14	1.52	1.33	L	0.46	0.61	0.54
E	1.91	2.29	2.10	M	4.32	--	--
F	8.89	9.65	9.27	N	5.21	-	-
G	0.84	1.14	0.99	O	2.29 BSC		



## DEVICE SPECIFICATION

apQ1HSN60AA

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600V/1.8A N-Channel MOSFET

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### Note

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### contact

**alpha pacific Technologies Co., Ltd**  
3F-6, No.18, Lane 609, Sec.5  
Chung Sin road, Shan Chang City  
Taipei-Hsien, TAIWAN, R.O.C

tel +886-2-2999 5456  
fax +886-2-2999 5270  
internet [www.alpha-pacific.com](http://www.alpha-pacific.com)