

#### 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

- 100V / 57A
- $R_{DS(on)} = 18m\Omega(max)$  ·  $V_{GS} = 10V$ ,  $I_D = 28.5A$
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability..



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

Symbol	Parameter	APQ57SN10BH-XXM0	Units
		APQ57SN10BH-XXJ0	
		TO-220	
$V_{DSS}$	Drain-Source Voltage	100	V
$I_D$	Drain Current - Continuous ( $T_C = 25^\circ C$ )	57	A
$I_{DM}$	Drain Current – Pulsed ①	228	A
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$E_{AS}$	Single Pulsed Avalanche Energy ②	1320	mJ
$I_{AR}$	Avalanche Current	57	A
$E_{AR}$	Repetitive Avalanche Energy	17	mJ
dv/dt	Peak Diode Recovery dv/dt ③	6.2	V/ns
$P_D$	Power Dissipation ( $T_C = 25^\circ C$ ) - De-ate above $25^\circ C$	162	W
		1.07	W/ $^\circ C$
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +150	$^\circ C$
$T_L$	soldering temperature for 10 seconds	300	$^\circ C$

\* note :

- ① Repetitive Rating: Pulse width limited by maximum junction temperature.
- ②  $V_{DD} = 25V$ , starting  $T_J = 25^\circ C$ ,  $L = TBD$ ,  $R_G = 0\Omega$ ,  $I_{AS} = 57A$
- ③  $I_{SD} \leq 35A$ ,  $di/dt \leq 300A/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 150^\circ C$ .

#### 4 Thermal Characteristics

Symbol	Parameter	APQ57SN10BH-XXM0		Units
		APQ57SN10BH-XXJ0		
		TO-220		
		Typ.	Max.	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	--	0.94	°C/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink Typ.	0.5	--	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	62.5	°C/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	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	100	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 1\text{ mA}$ , Referenced to $25^\circ\text{C}$	--	0.01	--	V/°C
$I_{DSS}$	Gate to Source leakage current	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$	--	--	20	$\mu\text{A}$
$I_{GSSF}$	Gate-Body Leakage Current, Forward	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
$I_{GSSR}$	Gate-Body Leakage Current, Reverse	$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$	--	--	-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	$V_{GS} = 10\text{ V}, I_D = 28.5\text{ A}$ ④	--	--	18	m $\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 15\text{ V}, I_D = 28.5\text{ A}$ ①	--	--	100	S
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}$	--	2480	--	pF
$C_{oss}$	Output Capacitance		--	717	--	pF
$C_{rss}$	Reverse Transfer Capacitance		--	149	--	pF
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 50\text{ V}, I_D = 28.5\text{ A}, R_G = 6.8\ \Omega, R_D = 1.4\ \Omega, V_{GS} = 10\text{ V}$ ④	--	28	--	ns
$t_r$	Turn-On Rise Time		--	473	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	128	--	ns
$t_f$	Turn-Off Fall Time		--	155	--	ns
$Q_g$	Total Gate Charge	$V_{DS} = 80\text{ V}, I_D = 28.5\text{ A}, V_{GS} = 10\text{ V}$ ④	--	83	--	nC
$Q_{gs}$	Gate-Source Charge		--	15.7	--	nC
$Q_{gd}$	Gate-Drain Charge		--	40	--	nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain-Source Diode Forward Current	--	--	57	--	A
$I_{SM}$	Maximum Pulsed Drain-Source Diode Forward Current	--	--	228	--	A



# DEVICE SPECIFICATION

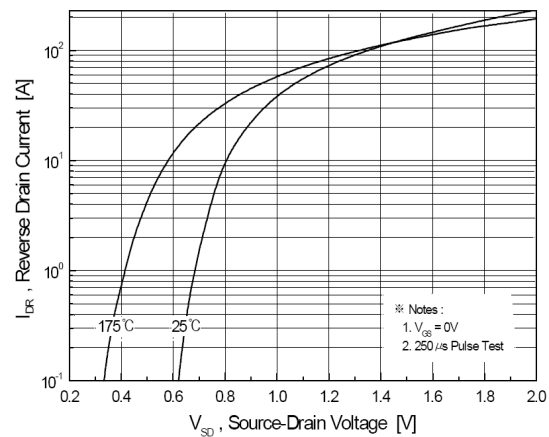
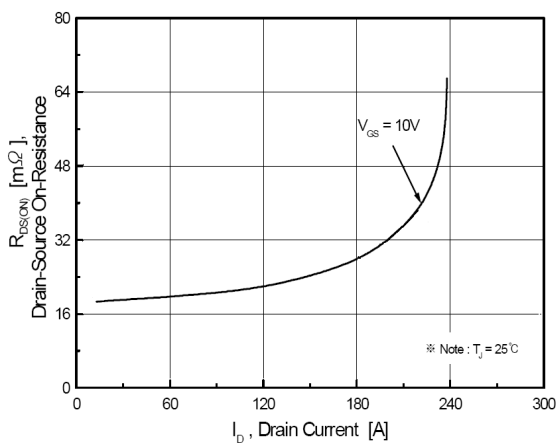
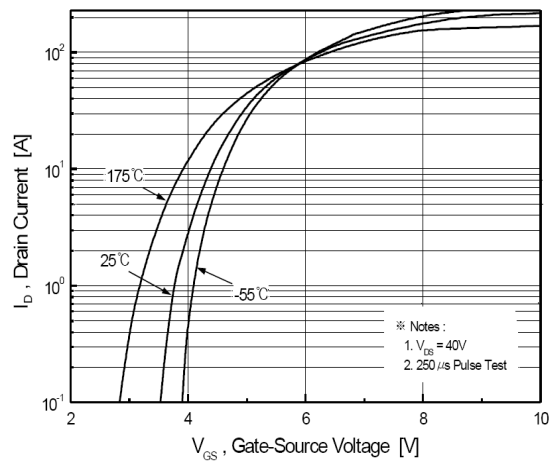
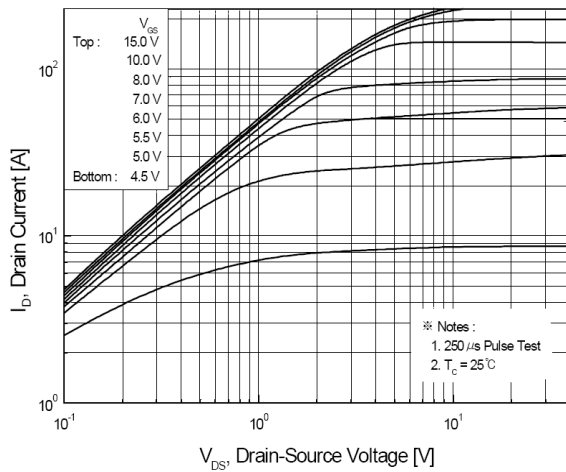
## APQ57SN10BH

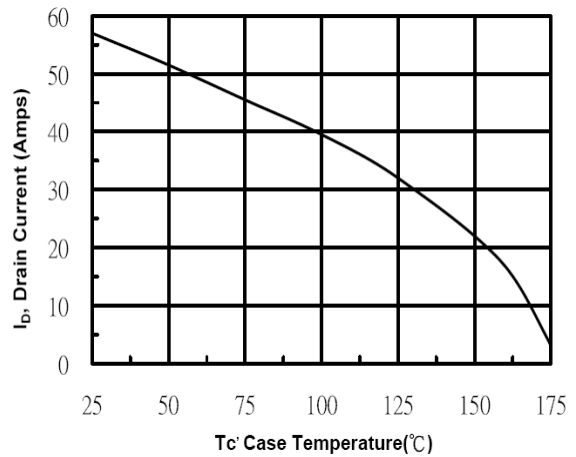
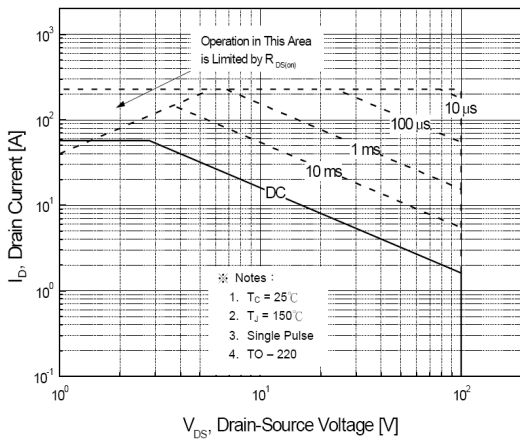
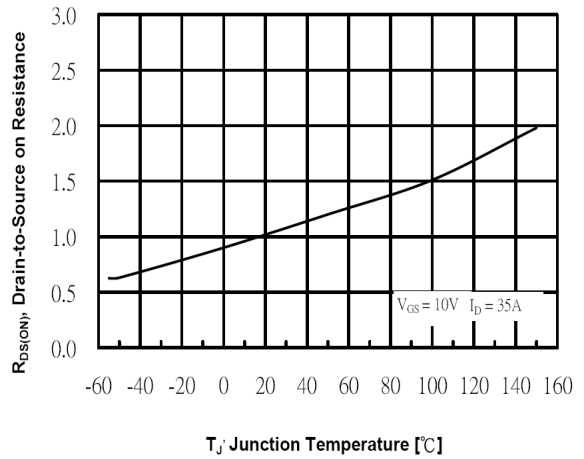
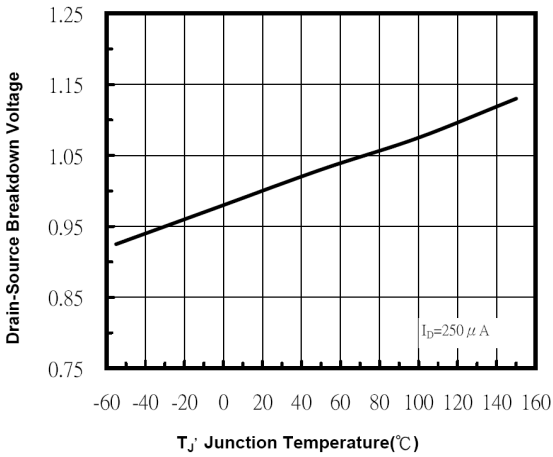
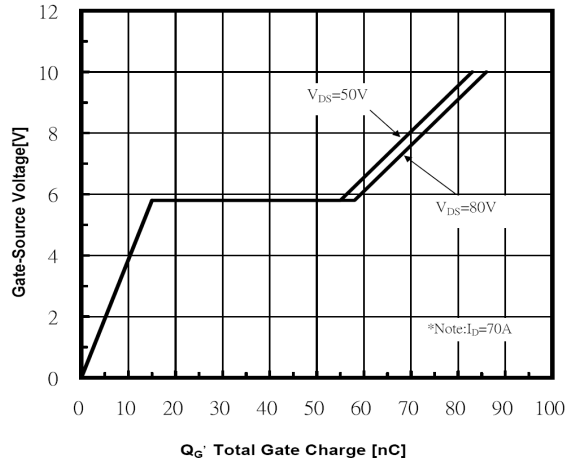
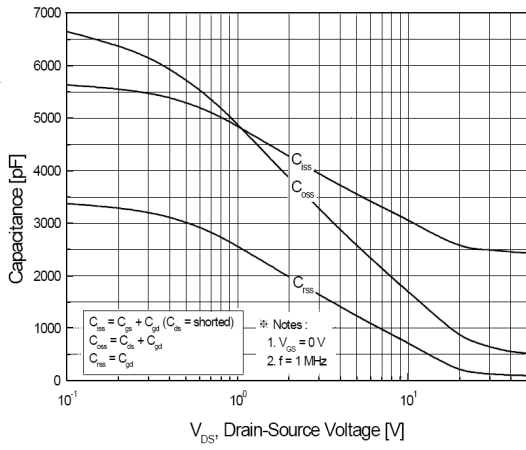
### 100V/57A N-Channel MOSFET

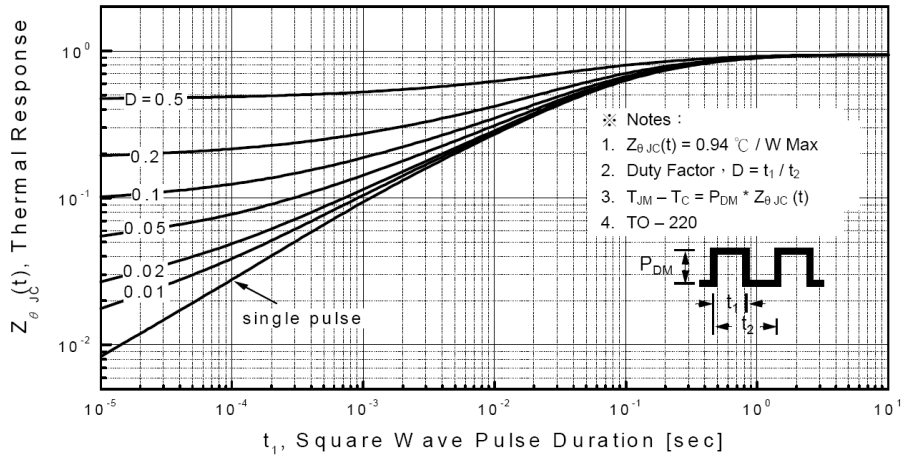
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 28.5\text{ A}$	--	--	1.3	V
$t_{rr}$	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_F = 35\text{ A},$ $di_F/dt = 100\text{ A}/\mu\text{s}$ ④	--	111	--	ns
$Q_{rr}$	Reverse Recovery Charge		--	44	--	$\mu\text{C}$

**Notes:**

- ① Repetitive Rating: Pulse width limited by maximum junction temperature.
- ②  $V_{DD} = 25\text{ V}$ , starting  $T_J = 25^\circ\text{C}$ ,  $L = \text{TBD}$ ,  $R_G = 0\Omega$ ,  $I_{AS} = 57\text{ A}$
- ③  $I_{SD} \leq 35\text{ A}$ ,  $di/dt \leq 300\text{ A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 150^\circ\text{C}$
- ④ Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$ . Depend on FT Test.
- ⑤ CP Test



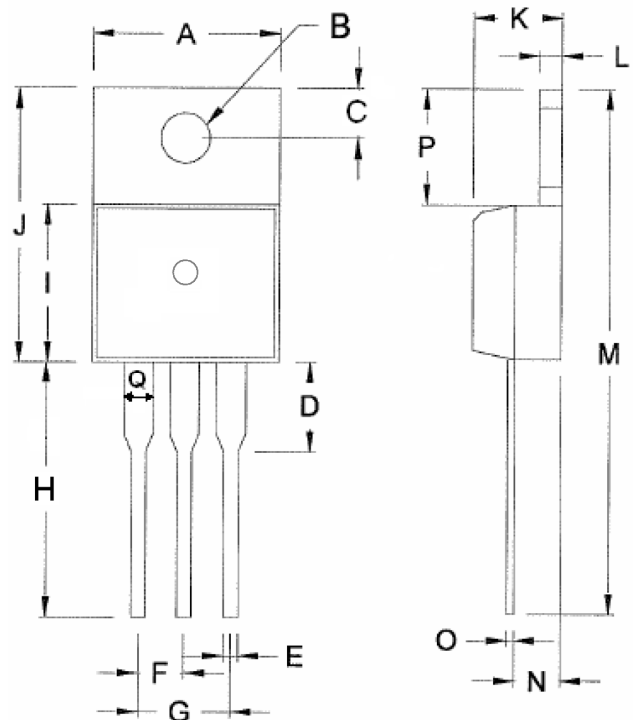




#### 6 Package Dimensions

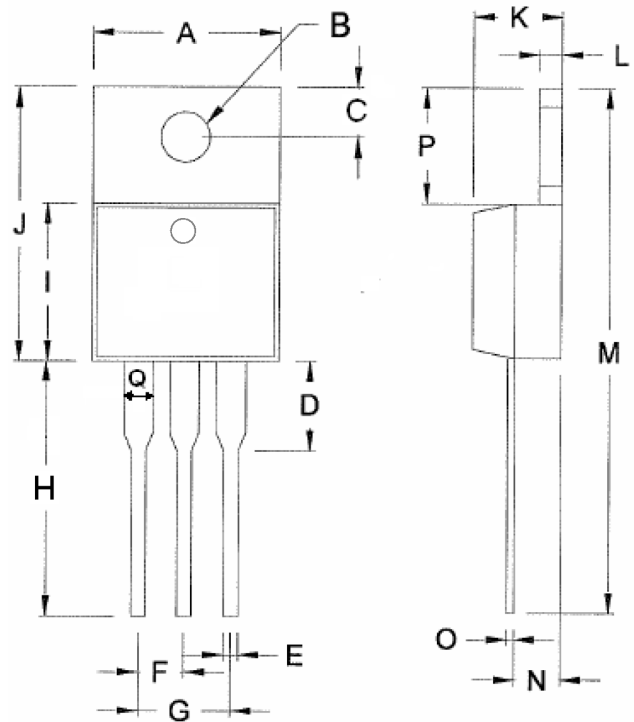
APQ57SN10BH-XXM0  
TO-220

TO-220 DIMENSION			
DIM	MILLIMETERS		
	MIN	MAX	TYP.
A	10.04	10.41	10.23
B	3.66	3.88	3.77
C	2.50	2.84	2.67
D	3.31	4.50	3.91
E	0.70	0.91	0.81
F	2.54 TYP.		
G	5.08 TYP.		
H	13.47	14.20	13.84
I	8.50	9.00	8.80
J	14.80	15.49	15.15
K	4.32	4.57	4.45
L	1.22	1.42	1.30
M	28.27	29.69	28.98
N	2.40	2.90	2.65
O	0.36	0.53	0.45
P	5.97	6.47	6.22
Q	1.15	1.45	1.30



APQ57SN10BH-XXJ0  
TO-220

TO-220 DIMENSION			
DIM	MILLIMETERS		
	MIN	MAX	TYP.
A	10.01	10.31	10.16
B	3.66	3.94	3.80
C	2.59	2.89	2.74
D	3.5	3.96	3.73
E	0.70	0.90	0.80
F	2.54 TYP.		
G	4.98	5.18	5.08
H	13.4	13.8	13.6
I	8.5	8.9	8.70
J	14.65	15.35	15.05
K	4.47	4.67	4.57
L	1.22	1.42	1.32
M	28.05	29.15	28.60
N	2.52	2.82	2.67
O	0.31	0.53	0.42
P	6.10	6.50	6.30
Q	1.17	1.37	1.27





## DEVICE SPECIFICATION

APQ57SN10BH

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100V/57A N-Channel MOSFET

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### Note

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