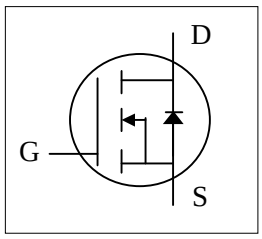
AP9972GS/P-HF

Halogen-Free Product

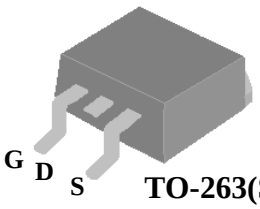
Advanced Power Electronics Corp.

N-CHANNEL ENHANCEMENT MODE POWER MOSFET

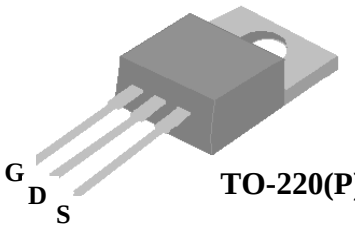
- ▼ **Low Gate Charge**
- ▼ **Simple Drive Requirement**
- ▼ **RoHS Compliant & Halogen-Free**



BV_{DSS}	60V
$R_{DS(ON)}$	18mΩ
I_D	60A



TO-263(S)



TO-220(P)

Description

AP9972 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.

The TO-263 package is widely preferred for all commercial-industrial surface mount applications using infrared reflow technique and suited for high current application due to the low connection resistance. The through-hole version (AP9972GP) are available for low-profile applications.

Absolute Maximum Ratings@T_j=25°C(unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	±25	V
I_D@T_C=25℃	Drain Current, V_{GS} @ 10V	60	A
I_D@T_C=100℃	Drain Current, V_{GS} @ 10V	38	A
I_{DM}	Pulsed Drain Current[1]	230	A
P_D@T_C=25℃	Total Power Dissipation	89	W
	Linear Derating Factor	0.7	W/℃
E_{AS}	Single Pulse Avalanche Energy[3]	45	mJ
I_{AR}	Avalanche Current[3]	30	A
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter	Value	Units
Rthj-c	Maximum Thermal Resistance, Junction-case	1.4	℃/W
Rthj-a	Maximum Thermal Resistance, Junction-ambient (PCB mount)[4]	40	℃/W
Rthj-a	Maximum Thermal Resistance, Junction-ambient	62	℃/W

Electrical Characteristics@T_j=25°C(unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	60	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to 25℃, I_D=1mA	-	0.06	-	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V, I_D=35A	-	-	18	mΩ
		V_{GS}=4.5V, I_D=25A	-	-	22	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	1	-	3	V
g_{fs}	Forward Transconductance	V_{DS}=10V, I_D=35A	-	55	-	S
I_{DSS}	Drain-Source Leakage Current	V_{DS}=60V, V_{GS}=0V	-	-	10	uA
	Drain-Source Leakage Current (T_j=125°C)	V_{DS}=48V ,V_{GS}=0V	-	-	250	uA
I_{GSS}	Gate-Source Leakage	V_{GS}=±25V, V_{DS}=0V	-	-	±100	nA
Q_g	Total Gate Charge	I_D=35A	-	32	51	nC
Q_{gs}	Gate-Source Charge	V_{DS}=48V	-	8	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=4.5V	-	20	-	nC
$t_{d(on)}$	Turn-on Delay Time	V_{DS}=30V	-	11	-	ns
t_r	Rise Time	I_D=35A	-	58	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=3.3Ω,V_{GS}=10V	-	45	-	ns
t_f	Fall Time	R_D=0.86Ω	-	80	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	3170	5070	pF
C_{oss}	Output Capacitance	V_{DS}=25V	-	280	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	230	-	pF
R_g	Gate Resistance	f=1.0MHz	-	1.7	-	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage[2]	I_S=35A, V_{GS}=0V	-	-	1.2	V
t_{rr}	Reverse Recovery Time	I_S=35A, V_{GS}=0V,	-	50	-	ns
Q_{rr}	Reverse Recovery Charge	dI/dt=100A/μs	-	48	-	nC

Notes:

1.Pulse width limited by Max. junction temperature.

2.Pulse test

3.Starting T_j=25°C , V_{DD}=30V , L=100uH , R_G=25Ω , I_{AS}=30A.

4.Surface mounted on 1 in^2 copper pad of FR4 board

THIS PRODUCT IS SENSITIVE TO ELECTROSTATIC DISCHARGE, PLEASE HANDLE WITH CAUTION.

USE OF THIS PRODUCT AS A CRITICAL COMPONENT IN LIFE SUPPORT OR OTHER SIMILAR SYSTEMS IS NOT AUTHORIZED.

APEC DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

APEC RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN.

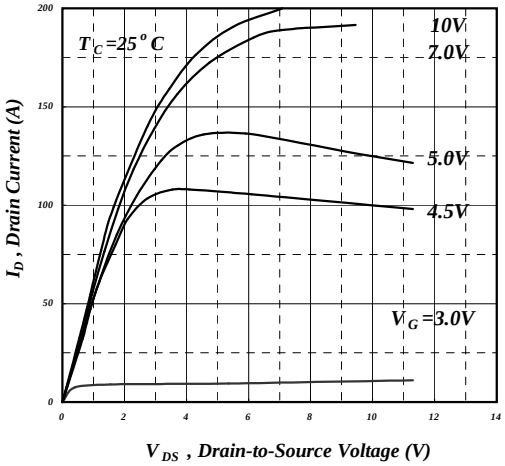


Fig 1. Typical Output Characteristics

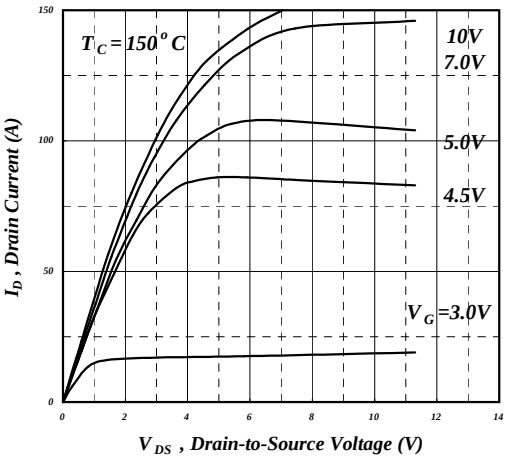


Fig 2. Typical Output Characteristics

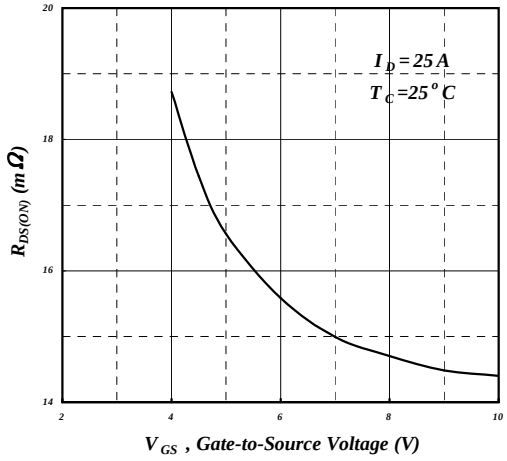


Fig 3. On-Resistance v.s. Gate Voltage

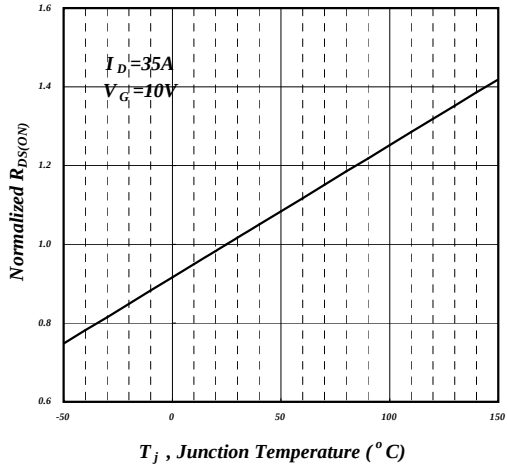


Fig 4. Normalized On-Resistance v.s. Junction Temperature

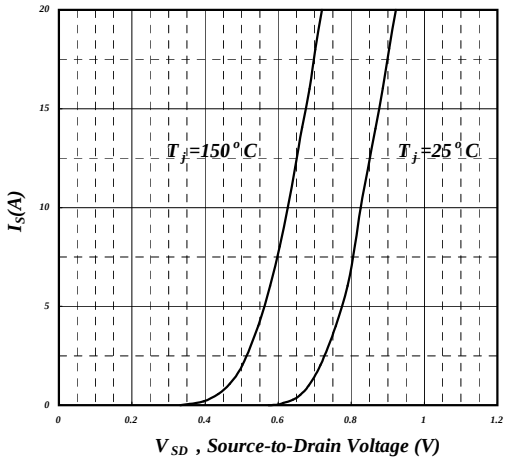


Fig 5. Forward Characteristic of Reverse Diode

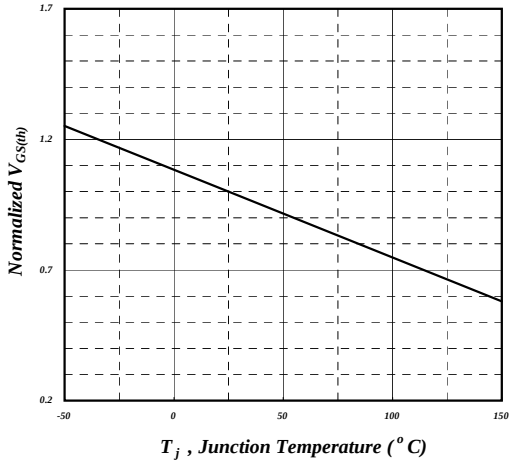


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

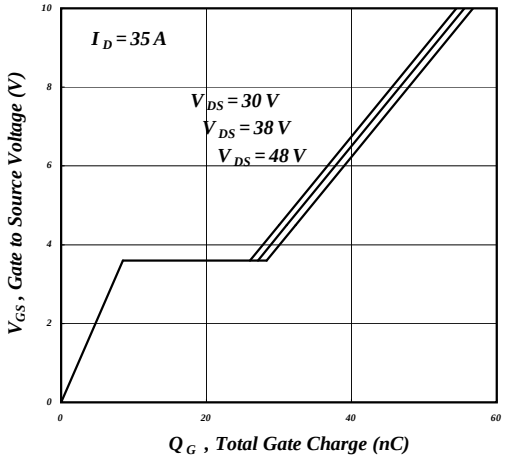


Fig 7. Gate Charge Characteristics

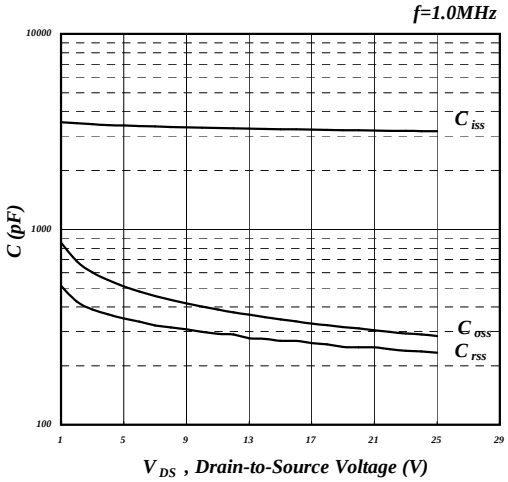


Fig 8. Typical Capacitance Characteristics

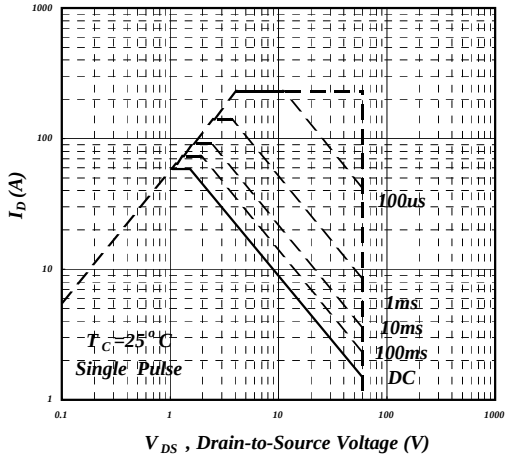


Fig 9. Maximum Safe Operating Area

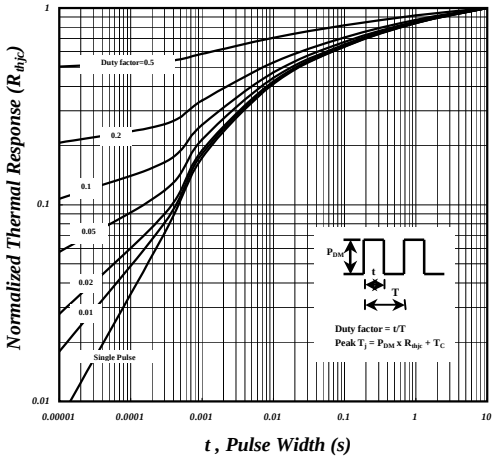


Fig 10. Effective Transient Thermal Impedance

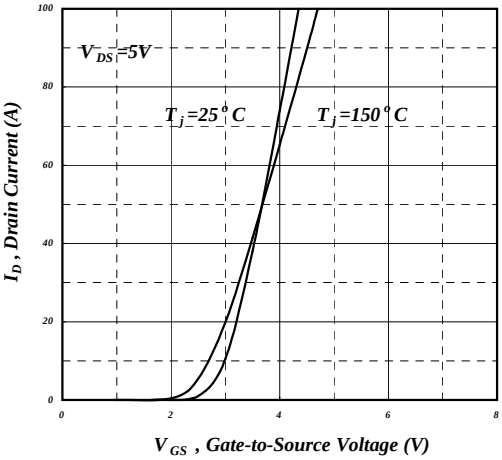


Fig 11. Transfer Characteristics

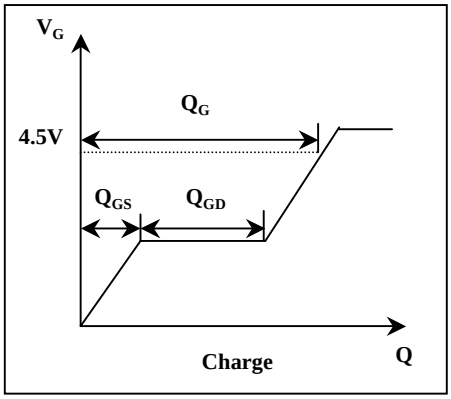
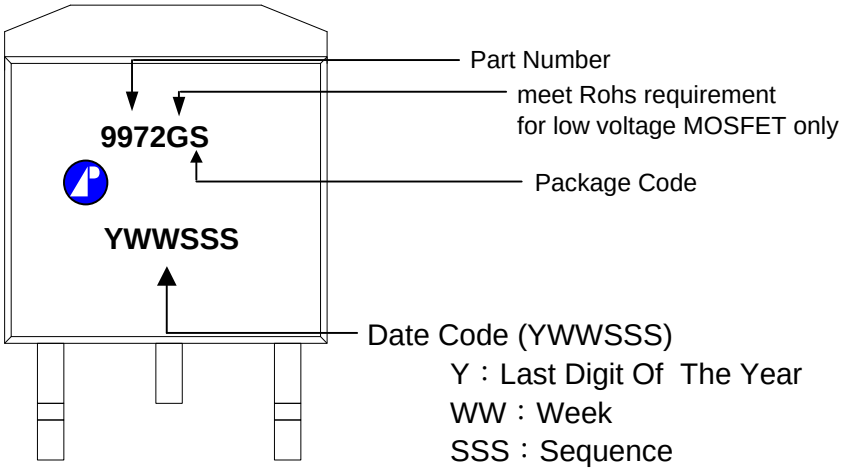


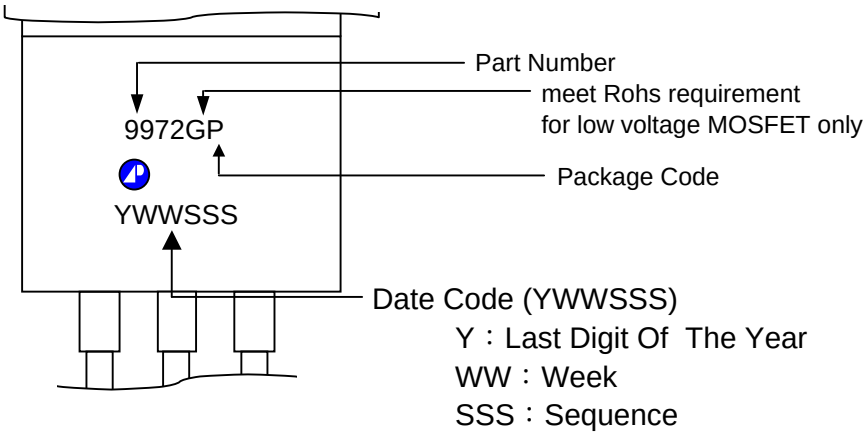
Fig 12. Gate Charge Waveform

MARKING INFORMATION

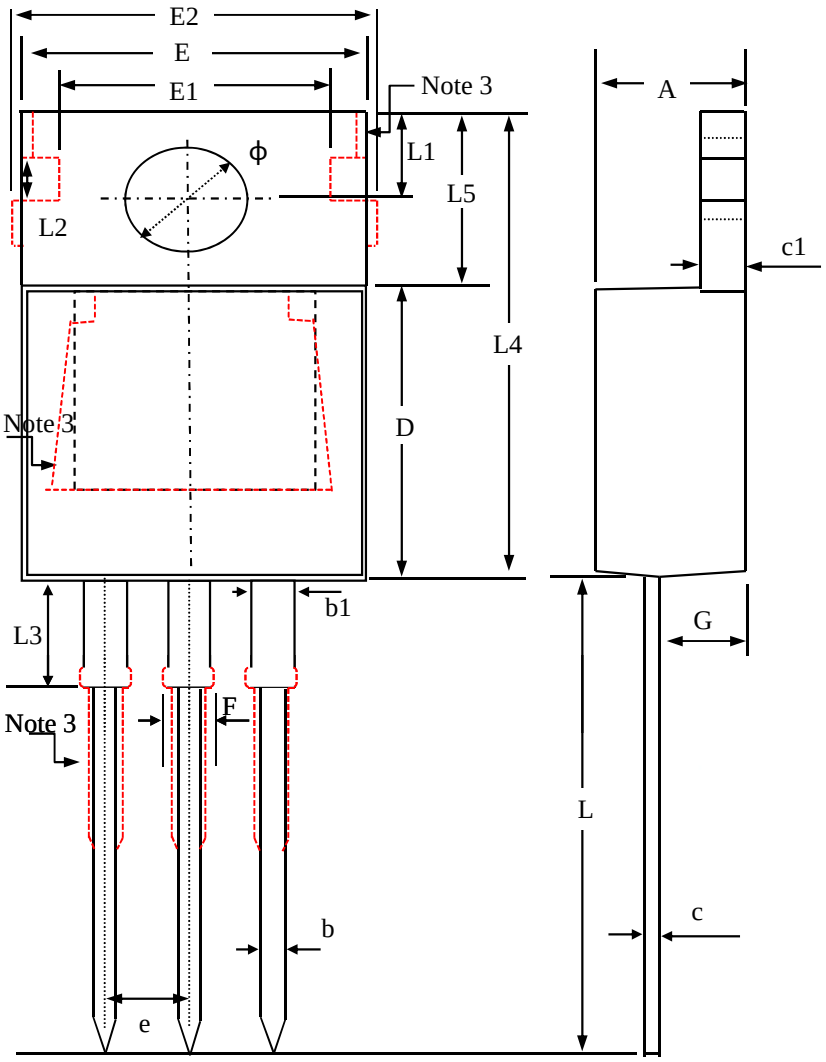
TO-263



TO-220



Package Outline : TO-220



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	4.20	4.50	4.80
b	0.60	0.80	1.00
b1	1.10	1.38	1.80
c	0.30	0.48	0.65
c1	1.10	1.30	1.50
E	9.70	10.00	10.40
E1	7.40	8.30	9.20
e	2.54 (ref.)		
L	12.70	13.60	14.50
L1	2.50	2.75	3.00
L2	1.00	1.40	1.80
L3	2.60	3.35	4.10
L4	14.30	15.15	16.00
L5	6.00	6.40	6.80
φ	3.40	3.70	4.00
D	8.30	8.85	9.40
F	1.20	1.41	1.85
G	2.20	2.60	3.00
E2	—	—	11.50

Note:

1.All Dimensions Are in Millimeters.

2.Dimension Does Not Include Mold Protrusions.

3. Thermal PAD and Pin contour is for reference, it may has little difference by option.

TO-220 FOOTPRINT：

