



**Advanced Power
Electronics Corp.**

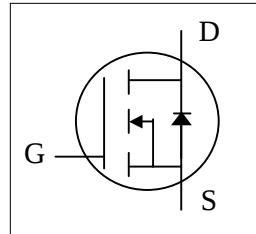
AP9977AGH-HF

Halogen-Free Product

N-CHANNEL ENHANCEMENT MODE

POWER MOSFET

- ▼ Low Gate Charge
- ▼ Single Drive Requirement
- ▼ Fast Switching Characteristic
- ▼ RoHS Compliant & Halogen-Free

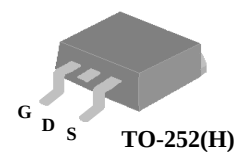


BV_{DSS}	60V
$R_{DS(ON)}$	100m Ω
I_D	9A

Description

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

The TO-252 package is widely preferred for commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_C = 25^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	9	A
$I_D @ T_C = 100^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	5.7	A
I_{DM}	Pulsed Drain Current ¹	30	A
$P_D @ T_C = 25^\circ\text{C}$	Total Power Dissipation	12.5	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	Units
Rthj-c	Maximum Thermal Resistance, Junction-case	10	$^\circ\text{C}/\text{W}$
Rthj-a	Maximum Thermal Resistance, Junction-ambient (PCB mount) ³	62.5	$^\circ\text{C}/\text{W}$



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
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =5A	-	-	100	mΩ
		V _{GS} =4.5V, I _D =4A	-	-	165	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 =5A	-	5	-	S
I _{DSS}	Drain-Source Leakage Current	V _{DS} =60V, V _{GS} =0V	-	-	10	uA
	Drain-Source Leakage Current (T _j =150°C)	V _{DS} =48V, V _{GS} =0V	-	-	100	uA
I _{GSS}	Gate-Source Leakage	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
Q _g	Total Gate Charge ²	I _D =5A	-	7	12	nC
Q _{gs}	Gate-Source Charge	V _{DS} =48V	-	1	-	nC
Q _{gd}	Gate-Drain ("Miller") Charge	V _{GS} =10V	-	2.4	-	nC
t _{d(on)}	Turn-on Delay Time ²	V _{DS} =30V	-	4	-	ns
t _r	Rise Time	I _D =5A	-	12	-	ns
t _{d(off)}	Turn-off Delay Time	R _G =3.3Ω, V _{GS} =10V	-	12	-	ns
t _f	Fall Time	R _D =6Ω	-	2.3	-	ns
C _{iss}	Input Capacitance	V _{GS} =0V	-	210	340	pF
C _{oss}	Output Capacitance	V _{DS} =25V	-	35	-	pF
C _{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	25	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V _{SD}	Forward On Voltage ²	I _S =10A, V _{GS} =0V	-	-	1.3	V
t _{rr}	Reverse Recovery Time ²	I _S =5A, V _{GS} =0V,	-	22	-	ns
Q _{rr}	Reverse Recovery Charge	dI/dt=100A/μs	-	17	-	nC

Notes:

- 1.Pulse width limited by Max. junction temperature.
- 2.Pulse test
- 3.Surface mounted on 1 in² 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.

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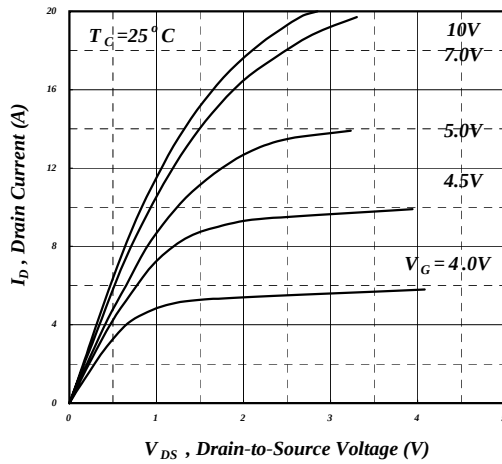


Fig 1. Typical Output Characteristics

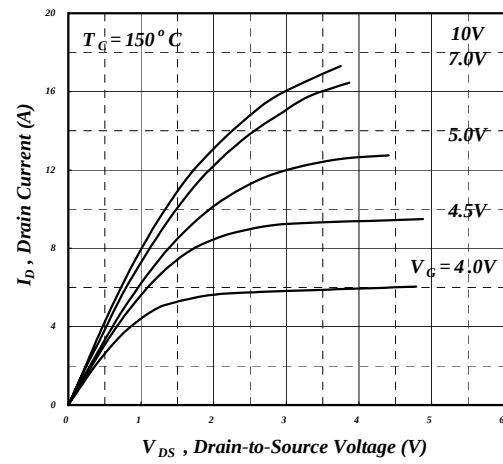


Fig 2. Typical Output Characteristics

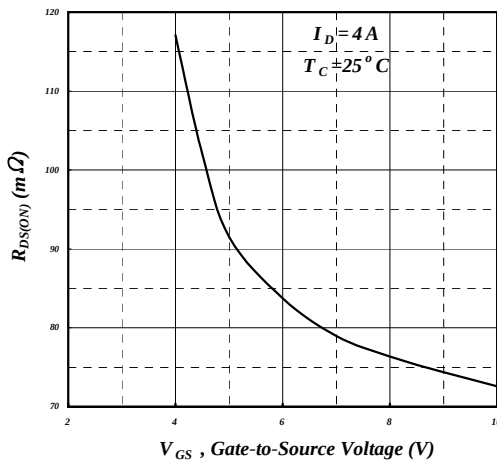


Fig 3. On-Resistance v.s. Gate Voltage

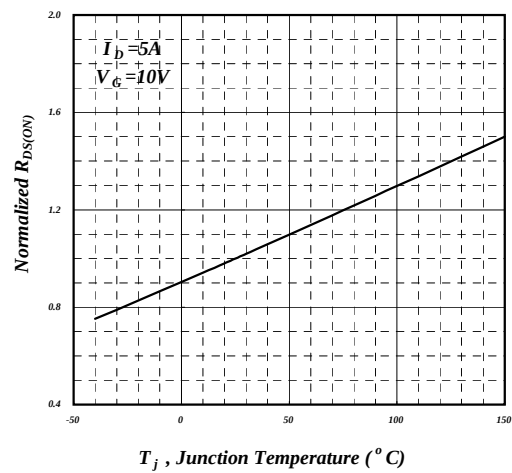


Fig 4. Normalized On-Resistance v.s. Junction Temperature

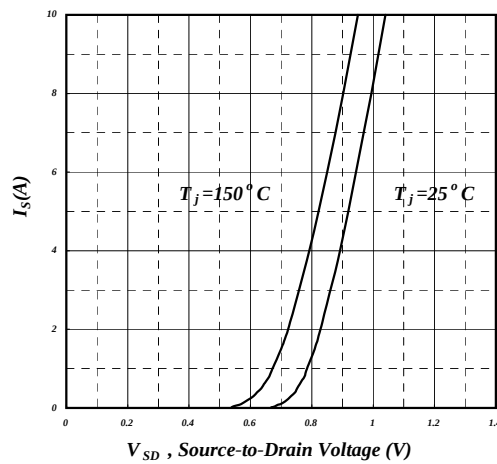


Fig 5. Forward Characteristic of Reverse Diode

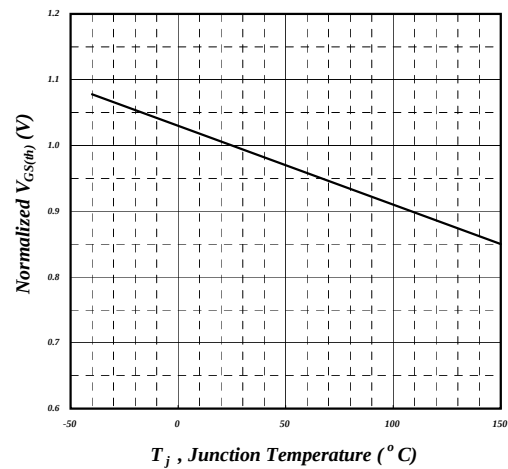


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

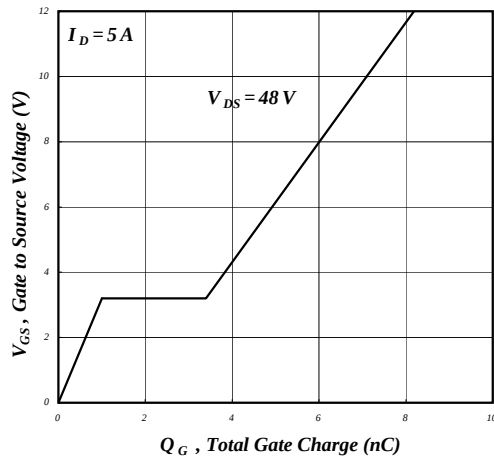


Fig 7. Gate Charge Characteristics

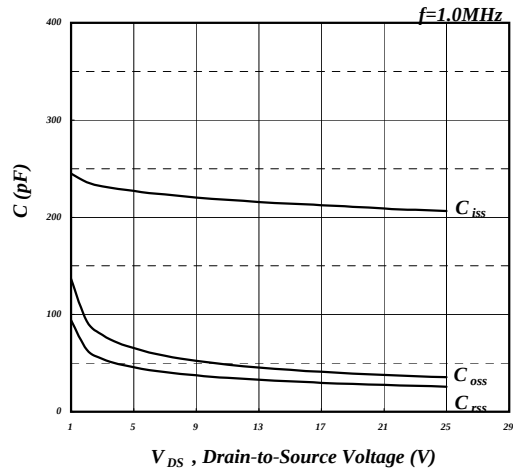


Fig 8. Typical Capacitance Characteristics

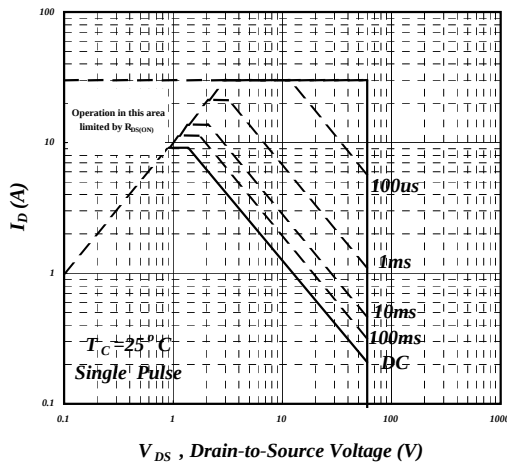


Fig 9. Maximum Safe Operating Area

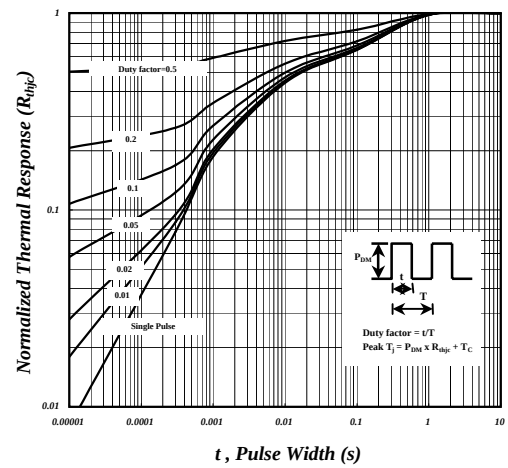


Fig 10. Effective Transient Thermal Impedance

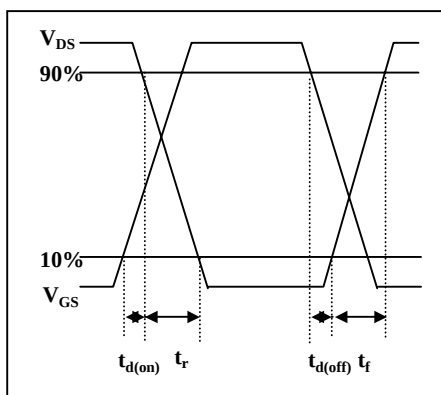


Fig 11. Switching Time Waveform

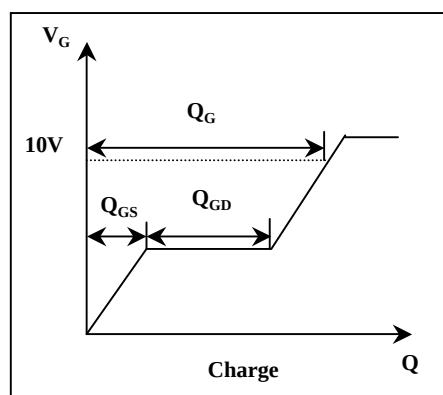
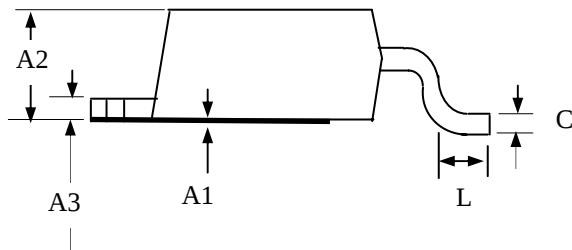
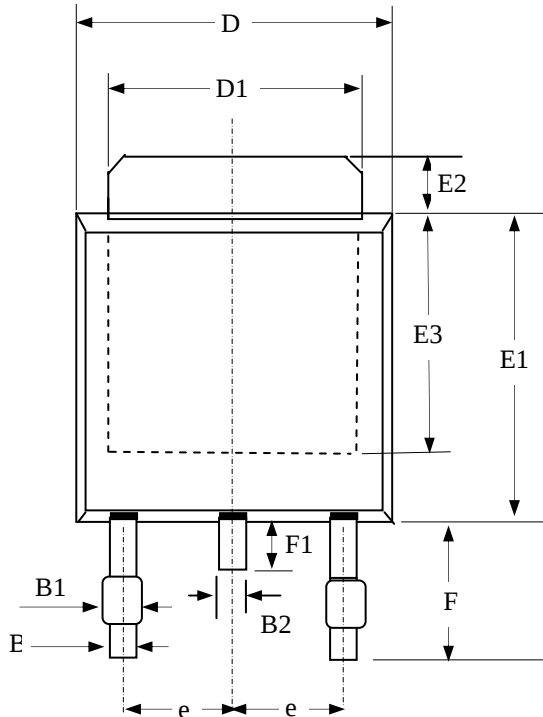


Fig 12. Gate Charge Waveform



Package Outline : TO-252



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A2	2.10	2.30	2.50
A3	0.40	0.50	0.65
B	0.40	0.70	1.00
B1	0.60	0.90	1.20
D	6.00	6.50	7.00
D1	4.80	5.35	5.90
E3	2.90	4.00	4.50
F	2.00	2.63	3.05
F1	0.50	0.85	1.20
E1	5.00	5.70	6.30
E2	0.50	1.10	1.80
e	2.3 (ref)		
C	0.35	0.525	0.70
A1	0.00	—	0.25
B2	—	—	1.25
L	0.90	1.34	1.78

1.All Dimensions Are in Millimeters.

2.Dimension Does Not Include Mold Protrusions.

Part Marking Information & Packing : TO-252

Laser Marking

