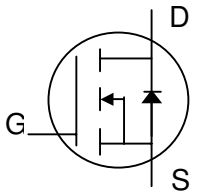
N-channel Enhancement-mode Power MOSFET

Low On-resistance

Simple Drive Requirement

Fast Switching Characteristics

RoHS-compliant, halogen-free



BV_{DSS}	60V
$R_{DS(ON)}$	6mΩ
I_D	100A

Description

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

The AP9990GH-HF-3 is in the TO-252 package, which is widely used for commercial and industrial surface-mount applications, and is well suited for low voltage applications such as DC/DC converters.

TO-252 (H)

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	±20	V
I_D at T_C=25℃	Continuous Drain Current (Silicon limited)	100	A
I_D at T_c=25℃	Continuous Drain Current (Package limited)	75	A
I_D at T_c=100℃	Continuous Drain Current	70	A
I_{DM}	Pulsed Drain Current[1]	300	A
P_D at T_c=25℃	Total Power Dissipation	125	W
P_D at T_A=25℃	Total Power Dissipation	2.4	W
T_{STG}	Storage Temperature Range	-55 to 175	℃
T_J	Operating Junction Temperature Range	-55 to 175	℃

Thermal Data

Symbol	Parameter	Value	Unit
Rthj-c	Maximum Thermal Resistance, Junction-case	1.2	℃/W
Rthj-a	Maximum Thermal Resistance, Junction-ambient (PCB mount)[3]	62.5	℃/W
Rthj-a	Maximum Thermal Resistance, Junction-ambient	110	℃/W

Ordering Information

AP9990GH-HF-3TR : in RoHS-compliant halogen-free TO-252, shipped on tape and reel (3000 pcs/reel)

Electrical Specifications at T_j=25℃ (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=40A	-	-	6	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	2	-	5	V
g_{fs}	Forward Transconductance	V_{DS}=10V, I_D=40A	-	55	-	S
I_{DSS}	Drain-Source Leakage Current	V_{DS}=48V, V_{GS}=0V	-	-	25	uA
I_{GSS}	Gate-Source Leakage	V_{GS}= ±20V, V_{DS}=0V	-	-	±100	nA
Q_g	Total Gate Charge[2]	I_D=40A	-	59	94	nC
Q_{gs}	Gate-Source Charge	V_{DS}=48V	-	14	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=10V	-	30	-	nC
$t_{d(on)}$	Turn-on Delay Time[2]	V_{DS}=30V	-	14	-	ns
t_r	Rise Time	I_D=40A	-	76	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=1Ω	-	25	-	ns
t_f	Fall Time	V_{GS}=10V	-	12	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	2320	3700	pF
C_{oss}	Output Capacitance	V_{DS}=25V	-	450	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	280	-	pF
R_g	Gate Resistance	f=1.0MHz	-	1.3	2.6	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage[2]	I_S=40A, V_{GS}=0V	-	-	1.3	V
t_{rr}	Reverse Recovery Time[2]	I_S=10A, V_{GS}=0V,	-	45	-	ns
Q_{rr}	Reverse Recovery Charge	dI/dt=100A/μs	-	70	-	nC

Notes:

1.Pulse width limited by Max. junction temperature.

2.Pulse test

3.Package limitation current is 75A.

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

Typical Electrical Characteristics

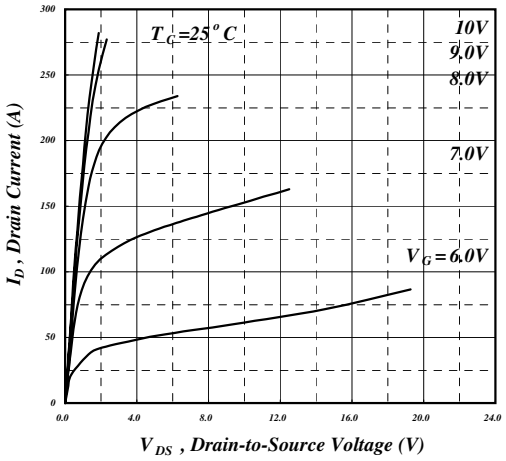


Fig 1. Typical Output Characteristics

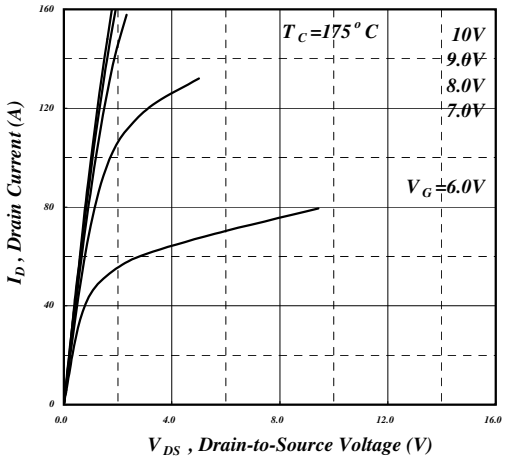


Fig 2. Typical Output Characteristics

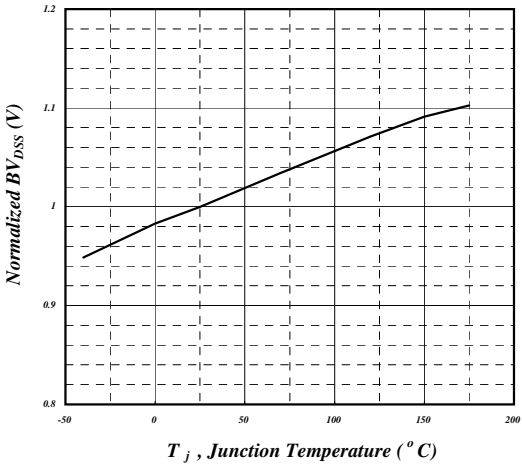


Fig 3. Normalized BVDSS vs. Junction Temperature

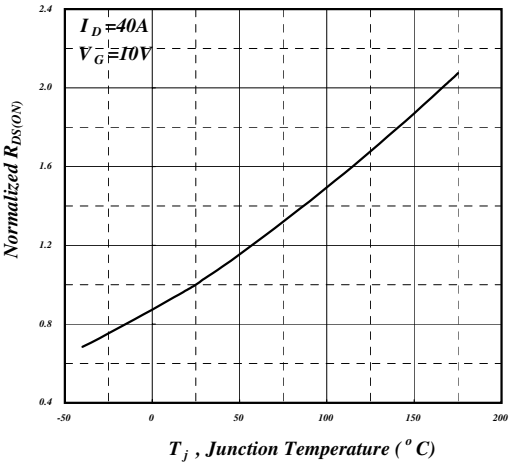


Fig 4. Normalized On-Resistance vs. Junction Temperature

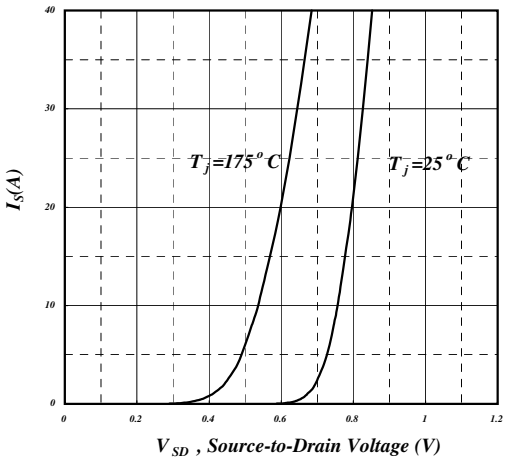


Fig 5. Forward Characteristic of Reverse Diode

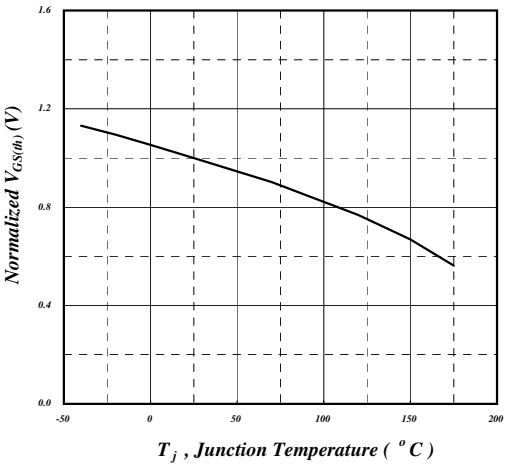


Fig 6. Gate Threshold Voltage vs. Junction Temperature

Typical Electrical Characteristics (cont.)

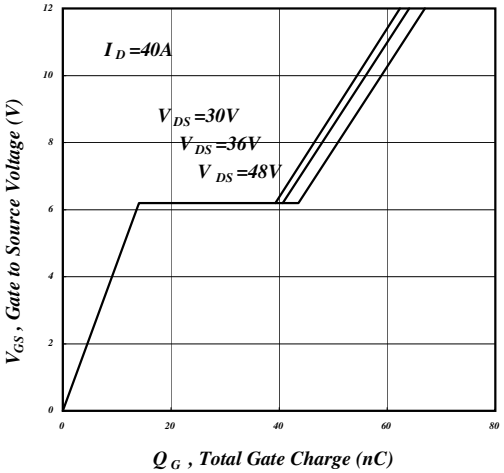


Fig 7. Gate Charge Characteristics

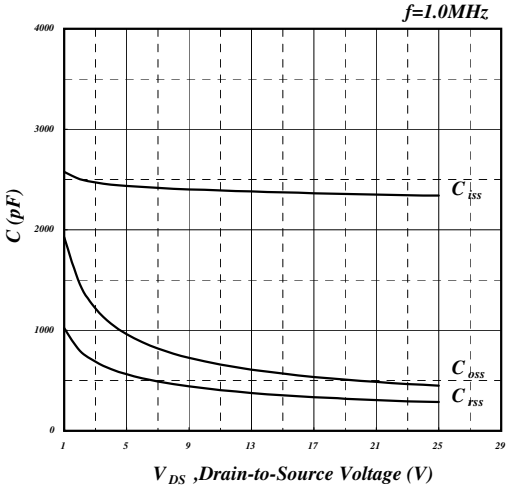


Fig 8. Typical Capacitance Characteristics

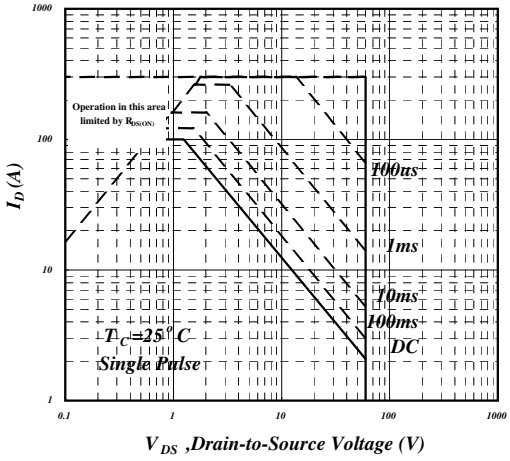


Fig 9. Maximum Safe Operating Area

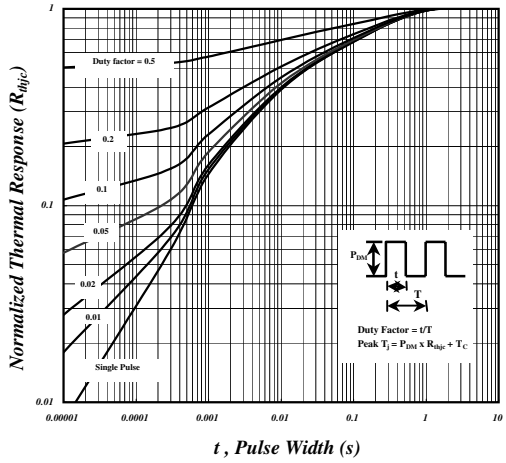


Fig 10. Effective Transient Thermal Impedance

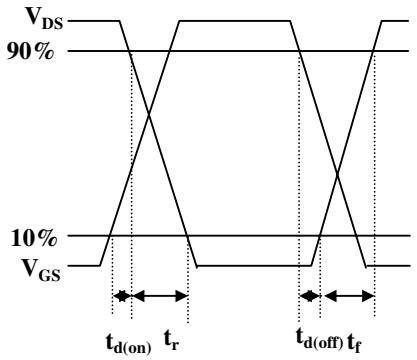


Fig 11. Switching Time Waveforms

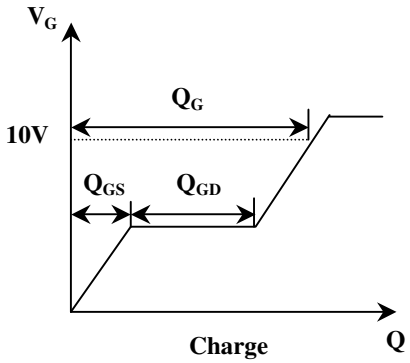
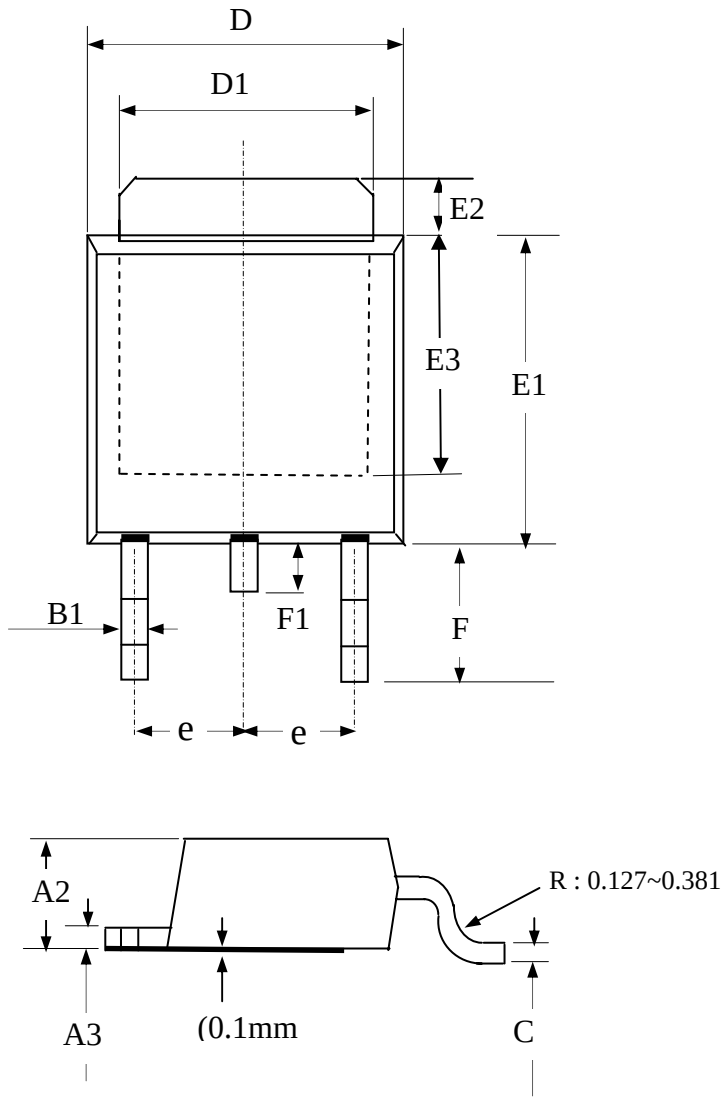


Fig 12. Gate Charge Waveform

Package Dimensions: TO-252



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A2	1.80	2.30	2.80
A3	0.40	0.50	0.60
B1	0.40	0.70	1.00
D	6.00	6.50	7.00
D1	4.80	5.35	5.90
E3	3.50	4.00	4.50
F	2.20	2.63	3.05
F1	0.50	0.85	1.20
E1	5.10	5.70	6.30
E2	0.50	1.10	1.80
e	--	2.30	--
C	0.35	0.50	0.65

1. All dimensions are in millimeters.
2. Dimensions do not include mold protrusions.

Marking Information:

Laser Marking