Dual N-channel Enhancement-mode Power MOSFETs

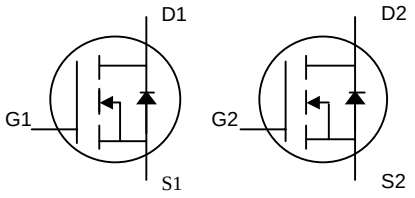
Simple Drive Requirement

Low On-resistance

Fast Switching Performance

RoHS-compliant, halogen-free SO-8 package

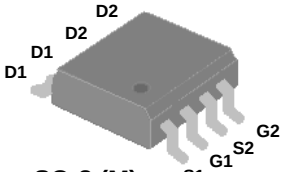
BV_{DSS}	60V
$R_{DS(ON)}$	100mΩ
I_D	3.3A



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 AP9977AGM-HF-3 is in the popular SO-8 surface-mount package and is well-suited for use in low-voltage DC/DC conversion and general load-switching applications.



SO-8 (M)

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	±25	V
I_D at T_A=25°C	Continuous Drain Current[3]	3.3	A
I_D at T_A=70°C	Continuous Drain Current[3]	2.7	A
I_{DM}	Pulsed Drain Current[1]	20	A
P_D at T_A=25°C	Total Power Dissipation	2	W
	Linear Derating Factor	0.016	W/°C
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Value	Unit
Rthj-a	Maximum Thermal Resistance, Junction-ambient[3]	62.5	°C/W

Ordering Information

AP9977GM-HF-3TR RoHS-compliant halogen-free SO-8, shipped on tape and reel (3000pcs/reel)

Electrical Characteristics at 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
$\Delta BV_{DSS}/\Delta Tj$	Breakdown Voltage Temperature Coefficient	Reference to 25°C, I_D=1mA	-	0.04	-	V/°C
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V, I_D=3A	-	-	100	mΩ
		V_{GS}=4.5V, I_D=2A	-	-	125	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=3A	-	6	-	S
I_{DSS}	Drain-Source Leakage Current (T_j=25°C)	V_{DS}=60V, V_{GS}=0V	-	-	10	uA
	Drain-Source Leakage Current (T_j=70°C)	V_{DS}=48V, V_{GS}=0V	-	-	25	uA
I_{GSS}	Gate-Source Leakage	V_{GS}=±25V	-	-	±100	nA
Q_g	Total Gate Charge[2]	I_D=3A	-	6	10	nC
Q_{gs}	Gate-Source Charge	V_{DS}=48V	-	2	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=4.5V	-	3	-	nC
$t_{d(on)}$	Turn-on Delay Time[2]	V_{DS}=30V	-	6	12	ns
t_r	Rise Time	I_D=1A	-	5	12	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=3.3Ω, V_{GS}=10V	-	16	32	ns
t_f	Fall Time	R_D=30Ω	-	3	8	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	510	810	pF
C_{oss}	Output Capacitance	V_{DS}=25V	-	55	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	35	-	pF
R_g	Gate Resistance	f=1.0MHz	-	1.3	-	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage[2]	I_S=1.7A, V_{GS}=0V	-	-	1.2	V
t_{rr}	Reverse Recovery Time[2]	I_S=4A, V_{GS}=0V,	-	27	54	ns
Q_{rr}	Reverse Recovery Charge	dI/dt=100A/μs	-	32	-	nC

Notes:

1.Pulse width limited by maximum junction temperature.

2.Pulse width ≤300us, duty cycle ≤2%

3.Surface-mounted on 1 in^2 copper pad of FR4 board; 135 °C/W when mounted on minimum copper pad.

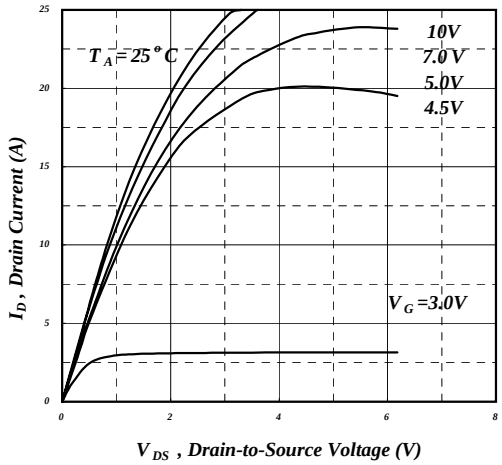


Fig 1. Typical Output Characteristics

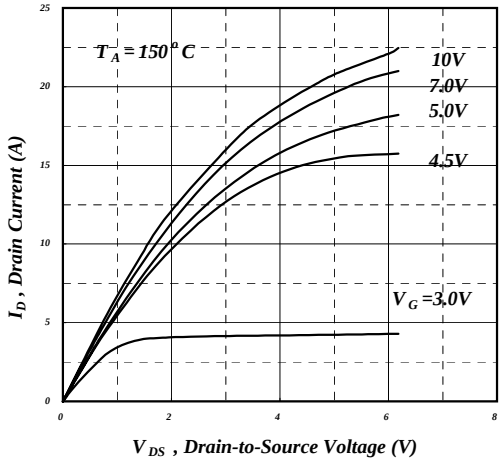


Fig 2. Typical Output Characteristics

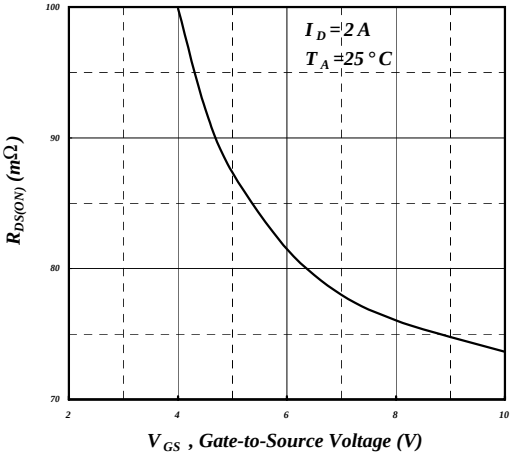


Fig 3. On-Resistance vs. Gate Voltage

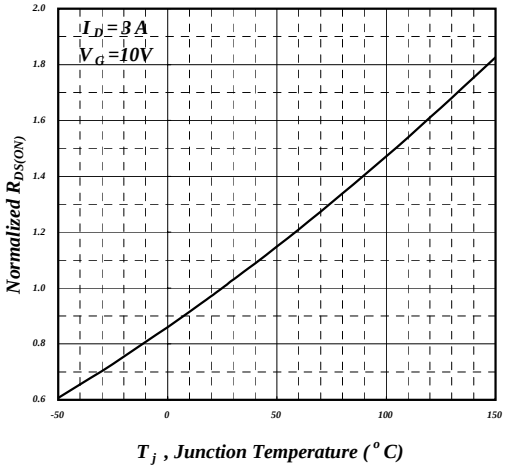


Fig 4. Normalized On-Resistance vs. Junction Temperature

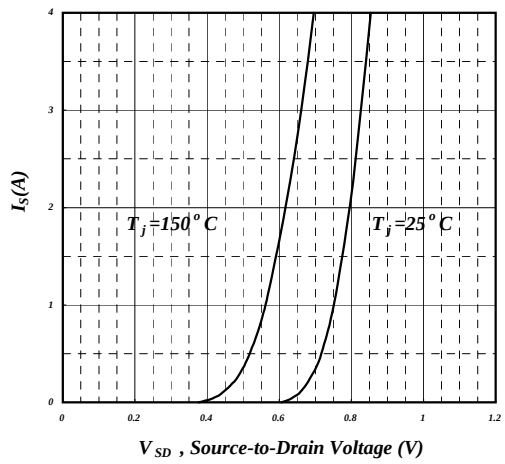


Fig 5. Forward Characteristic of Reverse Diode

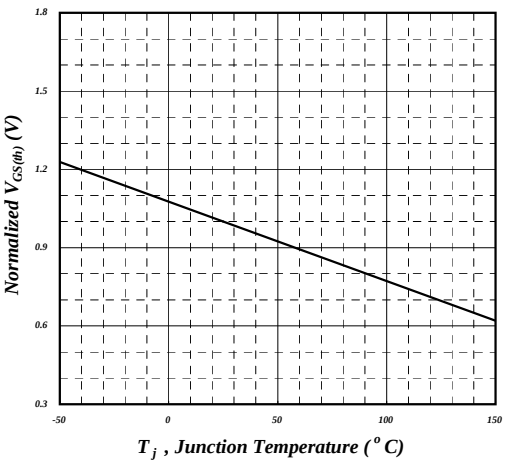


Fig 6. Gate Threshold Voltage vs. Junction Temperature

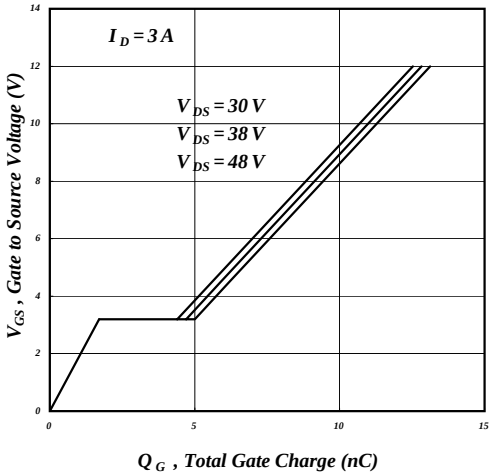


Fig 7. Gate Charge Characteristics

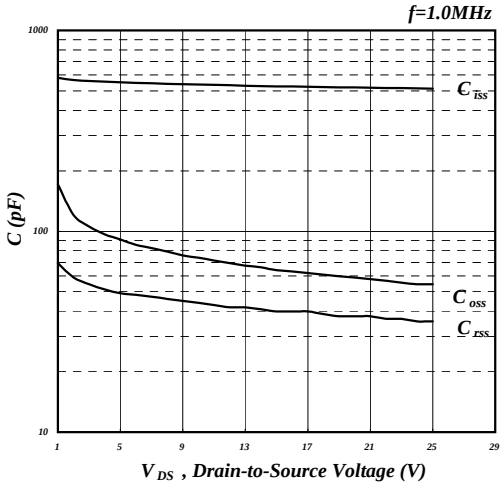


Fig 8. Typical Capacitance Characteristics

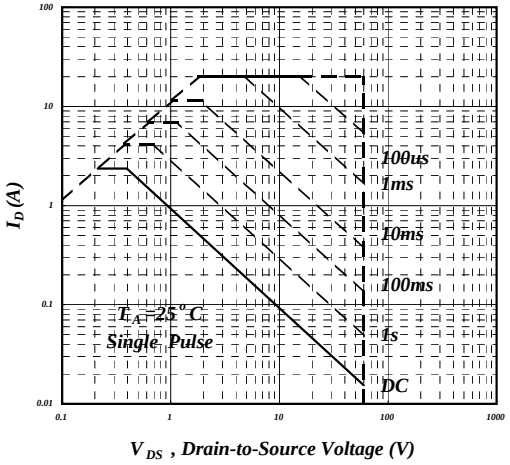


Fig 9. Maximum Safe Operating Area

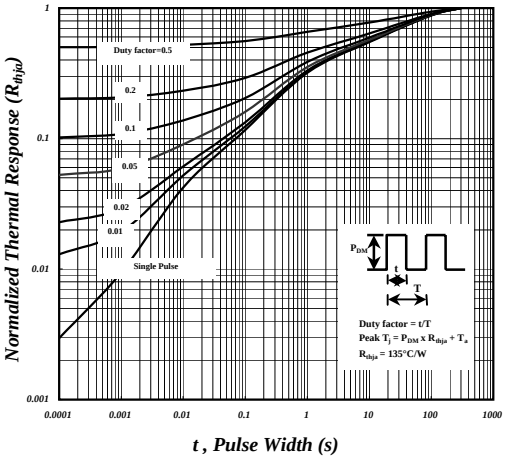


Fig 10. Effective Transient Thermal Impedance

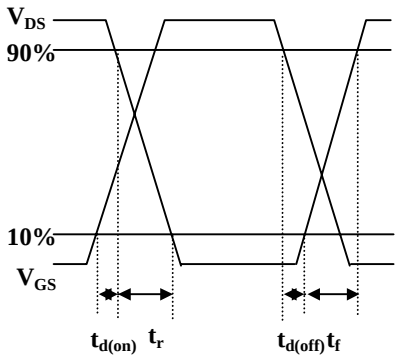


Fig 11. Switching Time Waveform

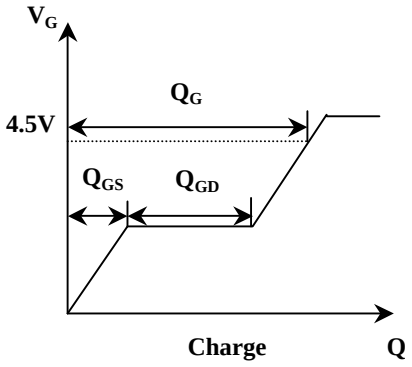
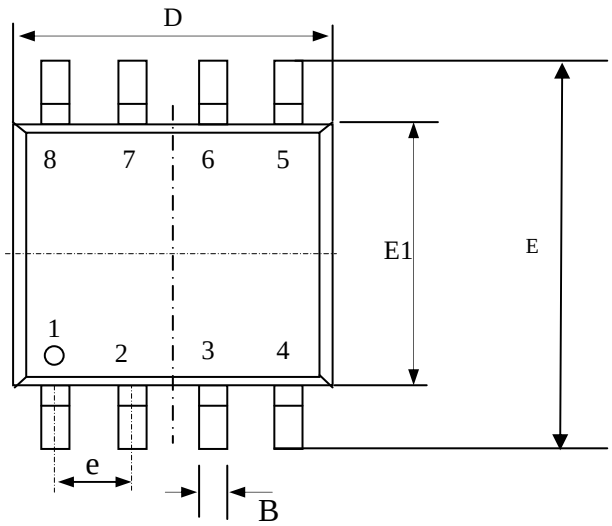
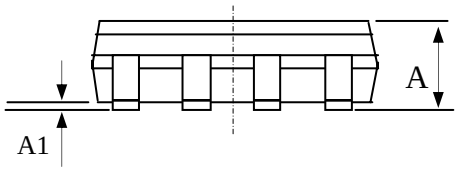


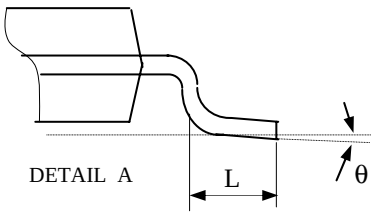
Fig 12. Gate Charge Waveform

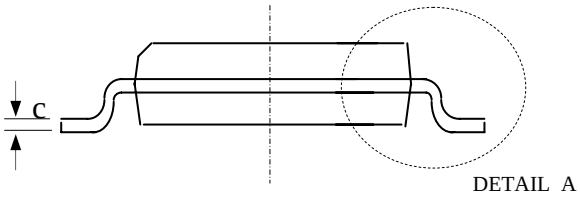
Package Dimensions: SO-8



	Millimeters		
SYMBOLS	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.10	0.18	0.25
B	0.33	0.41	0.51
C	0.19	0.22	0.25
D	4.80	4.90	5.00
E1	3.80	3.90	4.00
E	5.80	6.15	6.50
L	0.38	0.71	1.27
θ	0	4.00	8.00
e	1.27 TYP		

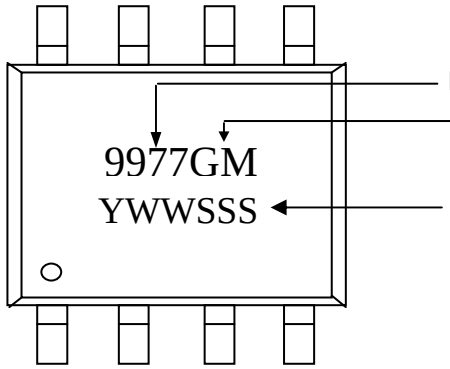






1. All dimensions are in millimeters.
2. Dimensions do not include mold protrusions.

Marking Information: SO-8



Product: AP9977

Package:

GM = RoHS-compliant halogen-free SO-8

Date/lot code (YWWSSS)

Y: Last digit of the year

WW: Work week

SSS: Lot code sequence