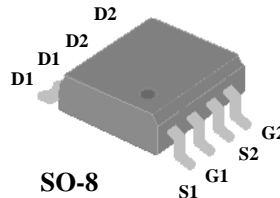




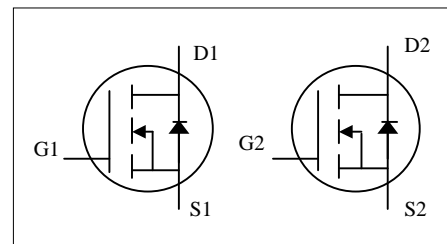
- ▼ Low On-Resistance
- ▼ Fast Switching Speed
- ▼ Surface Mount Package
- ▼ RoHS Compliant & Halogen-Free



BV_{DSS}	40V
$R_{DS(ON)}$	20m Ω
I_D	7.8A

Description

AP9960 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 SO-8 package is widely preferred for all commercial-industrial surface mount applications using infrared reflow technique and suited for voltage conversion or switch applications.

Absolute Maximum Ratings @ $T_J=25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_A=25^\circ\text{C}$	Drain Current, $V_{GS} @ 10V^3$	7.8	A
$I_D @ T_A=70^\circ\text{C}$	Drain Current, $V_{GS} @ 10V^3$	6.2	A
I_{DM}	Pulsed Drain Current ¹	20	A
$P_D @ T_A=25^\circ\text{C}$	Total Power Dissipation	2	W
	Linear Derating Factor	0.016	W/ $^\circ\text{C}$
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	Unit
$R_{thj-amb}$	Maximum Thermal Resistance, Junction-ambient ³	62.5	$^\circ\text{C}/\text{W}$



AP9960GM-HF

Electrical Characteristics @ $T_j=25^{\circ}\text{C}$ (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to $25^{\circ}\text{C}, I_D=1\text{mA}$	-	0.032	-	$V/^{\circ}\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V, I_D=7A$	-	-	20	$\text{m}\Omega$
		$V_{GS}=4.5V, I_D=5A$	-	-	32	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	-	3	V
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=7A$	-	25	-	S
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=40V, V_{GS}=0V$	-	-	1	μA
	Drain-Source Leakage Current ($T_j=70^{\circ}\text{C}$)	$V_{DS}=32V, V_{GS}=0V$	-	-	25	μA
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Q_g	Total Gate Charge	$I_D=7A$	-	14.7	-	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=20V$	-	7.1	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=4.5V$	-	6.8	-	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=20V$	-	11.5	-	ns
t_r	Rise Time	$I_D=1A$	-	6.3	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega, V_{GS}=10V$	-	28.2	-	ns
t_f	Fall Time	$R_D=20\Omega$	-	12.6	-	ns
C_{iss}	Input Capacitance	$V_{GS}=0V$	-	1725	-	pF
C_{oss}	Output Capacitance	$V_{DS}=25V$	-	235	-	pF
C_{riss}	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	145	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I_S	Continuous Source Current (Body Diode)	$V_D=V_G=0V, V_S=1.3V$	-	-	1.54	A
V_{SD}	Forward On Voltage ²	$T_j=25^{\circ}\text{C}, I_S=2.3A, V_{GS}=0V$	-	-	1.3	V

Notes:

1. Pulse width limited by Max. junction temperature.
2. Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. Surface mounted on 1 in² copper pad of FR4 board, $t \leq 10\text{sec}$; $135^{\circ}\text{C}/\text{W}$ when mounted on Min. copper pad.

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.

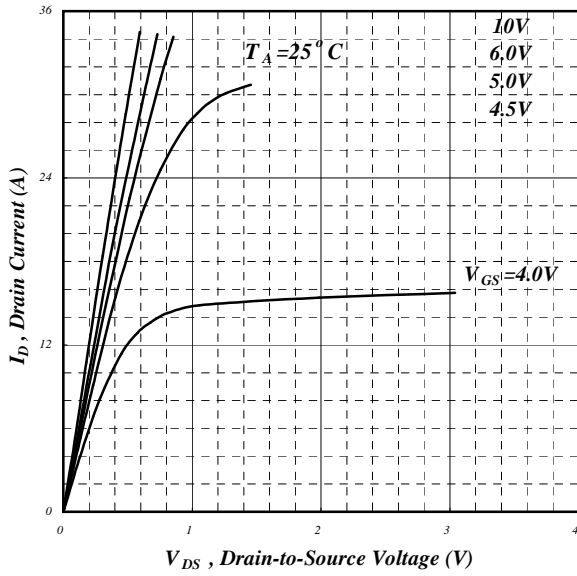


Fig 1. Typical Output Characteristics

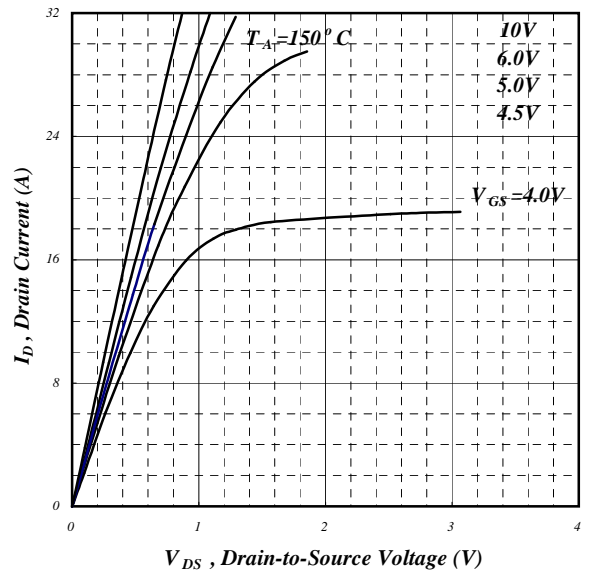


Fig 2. Typical Output Characteristics

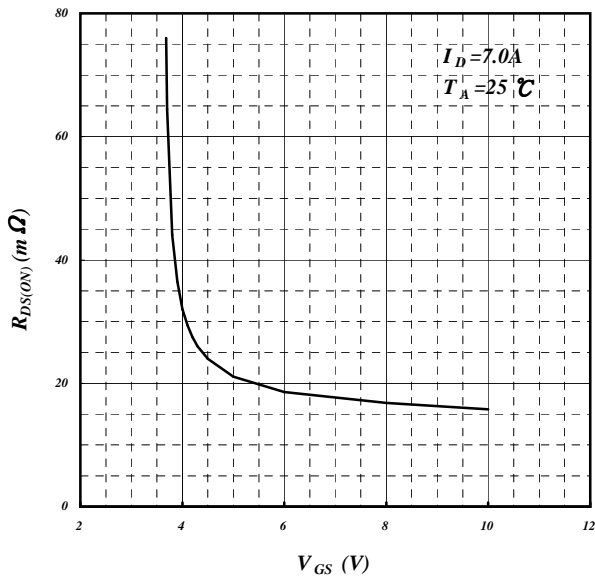


Fig 3. On-Resistance v.s. Gate Voltage

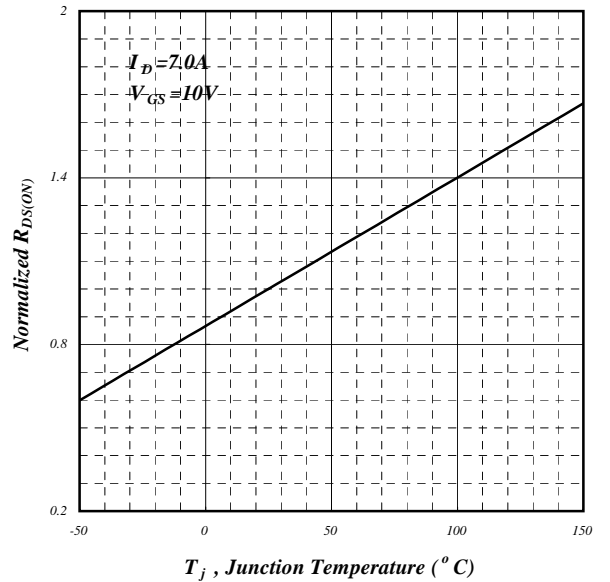


Fig 4. Normalized On-Resistance v.s. Junction Temperature

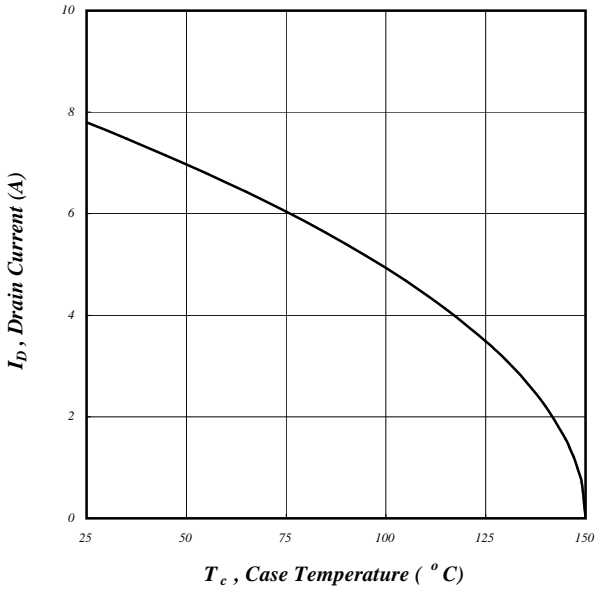


Fig 5. Maximum Drain Current v.s. Case Temperature

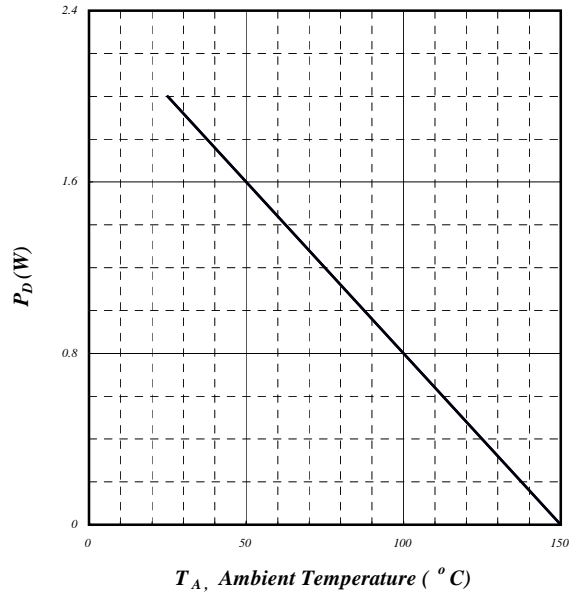


Fig 6. Typical Power Dissipation

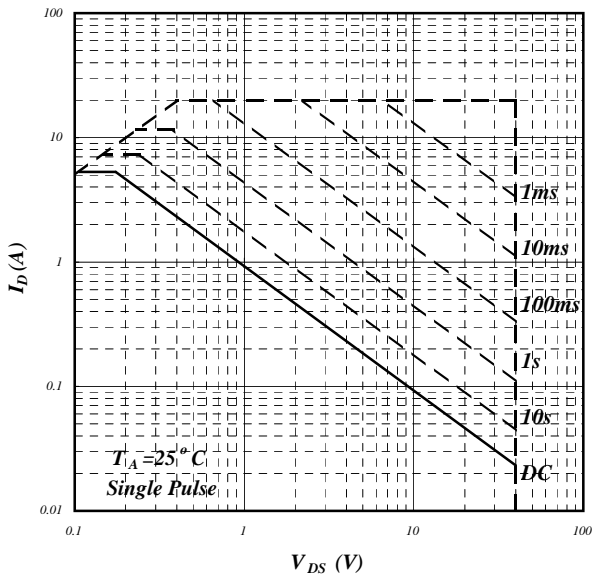


Fig 7. Maximum Safe Operating Area

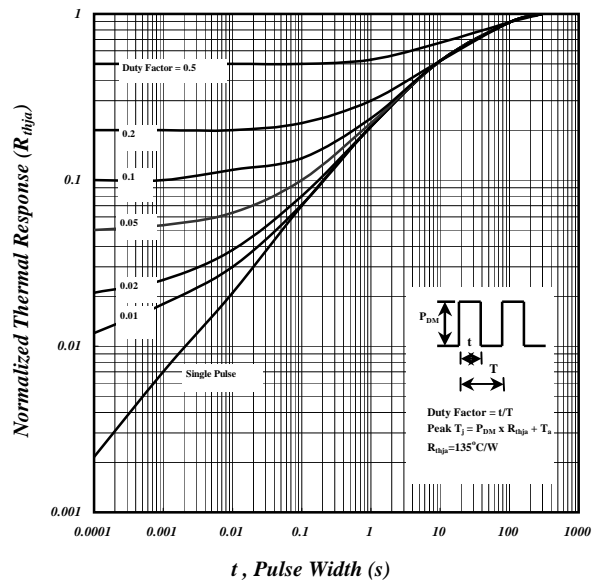


Fig 8. Effective Transient Thermal Impedance

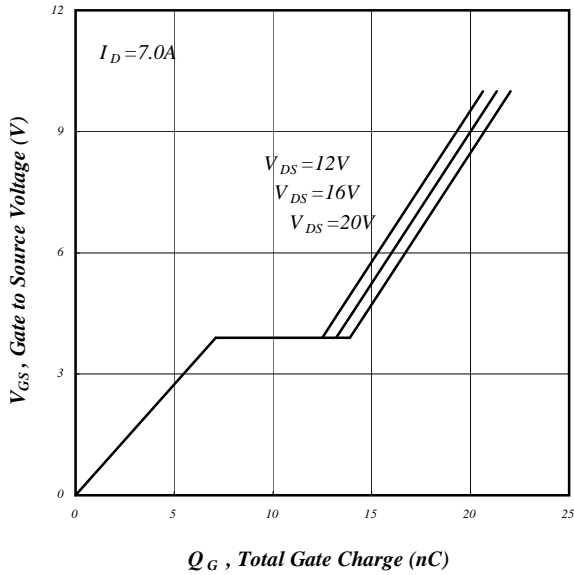


Fig 9. Gate Charge Characteristics

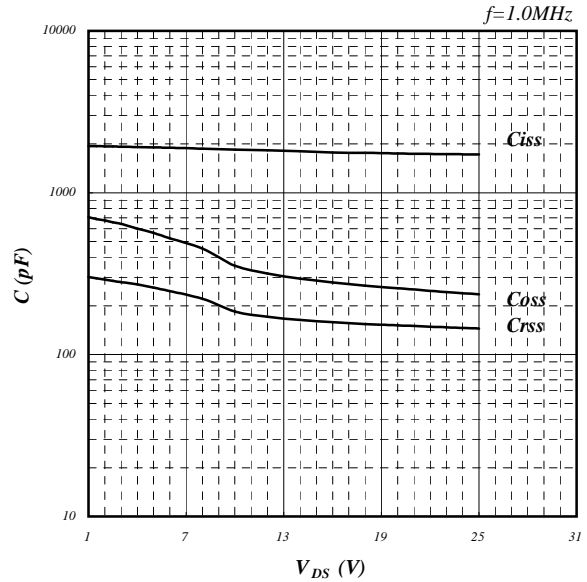


Fig 10. Typical Capacitance Characteristics

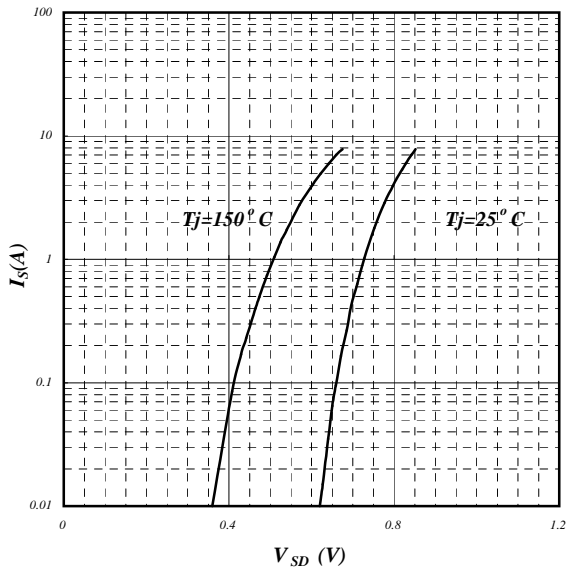


Fig 11. Forward Characteristic of Reverse Diode

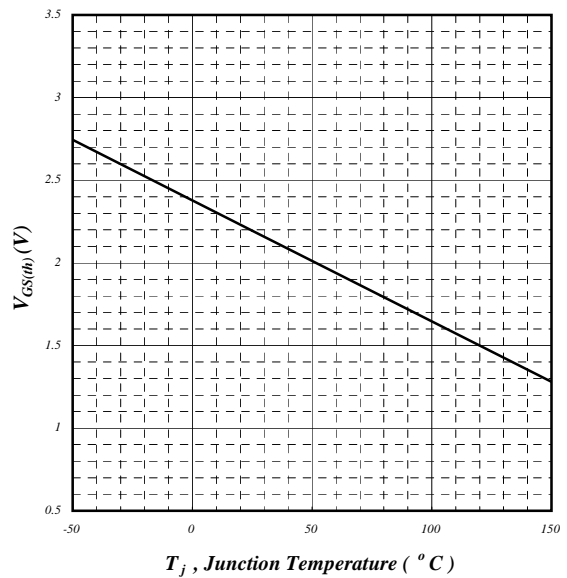


Fig 12. Gate Threshold Voltage v.s. Junction Temperature

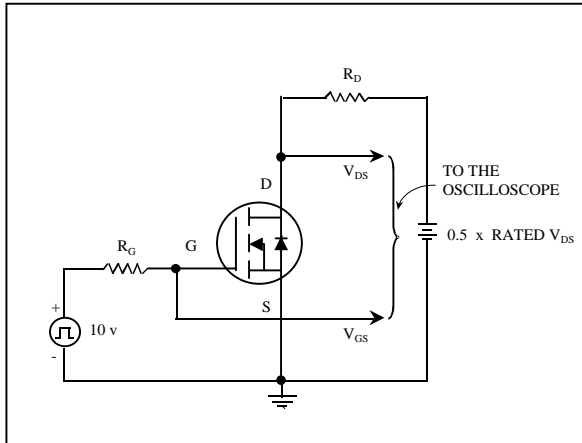


Fig 13. Switching Time Circuit

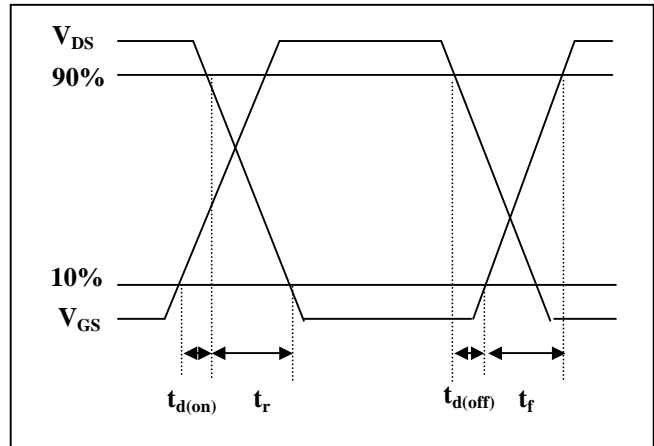


Fig 14. Switching Time Waveform

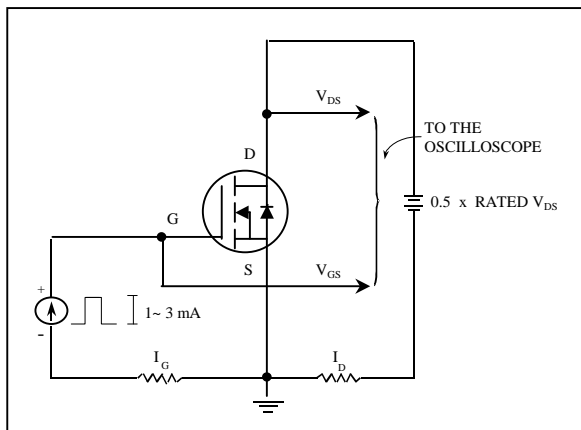


Fig 15. Gate Charge Circuit

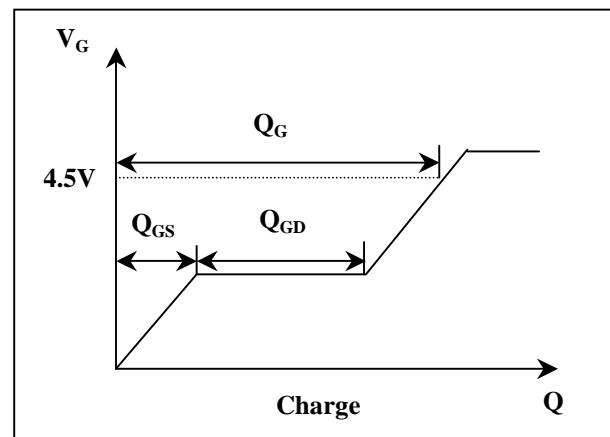
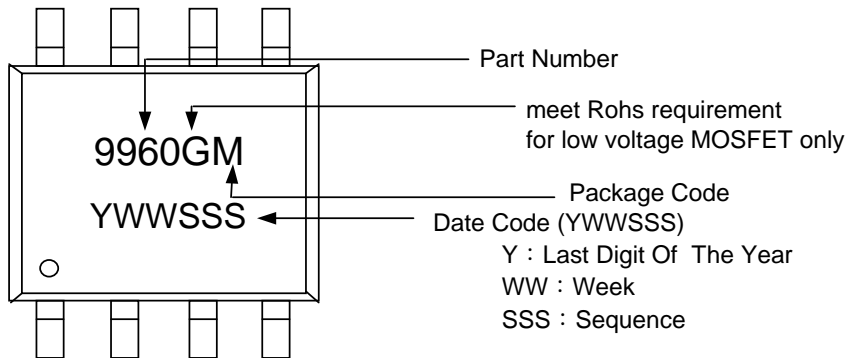


Fig 16. Gate Charge Waveform

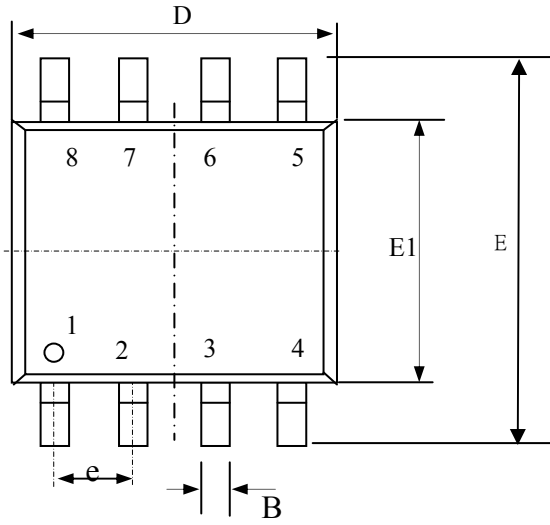


MARKING INFORMATION

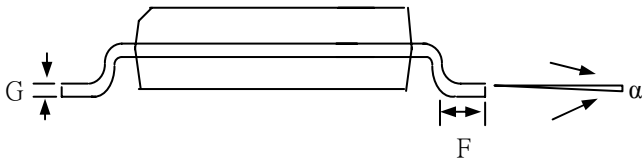
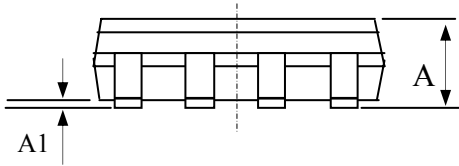




Package Outline : SO-8



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.05	0.15	0.25
B	0.30	0.41	0.51
D	4.80	5.05	5.30
E	5.79	6.00	6.20
E1	3.70	3.90	4.10
e	1.27 TYP		
G	0.17	0.21	0.25
F	0.38	0.83	1.27
α	0°	4°	8°



1. All Dimension Are In Millimeters.
2. Dimension Does Not Include Mold Protrusions.



SO-8 FOOTPRINT :

