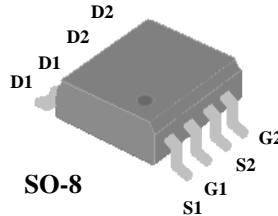




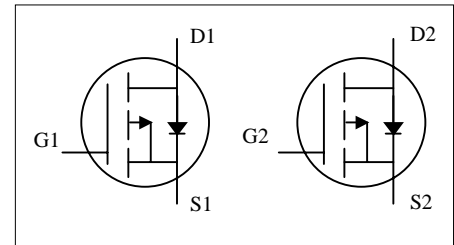
- ▼ Lower Turn-on Voltage
- ▼ Simple Drive Requirement
- ▼ Dual P MOSFET Package



$BV_{DSS}$	-16V
$R_{DS(ON)}$	65m $\Omega$
$I_D$	-4.7A

## Description

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



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-16	V
$V_{GS}$	Gate-Source Voltage	$\pm 8$	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current <sup>3</sup>	-4.7	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current <sup>3</sup>	-3.8	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	-20	A
$P_D @ T_A = 25^\circ C$	Total Power Dissipation	2	W
	Linear Derating Factor	0.016	W/ $^\circ C$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

## Thermal Data

Symbol	Parameter	Value	Unit
Rthj-a	Maximum Thermal Resistance, Junction-ambient <sup>3</sup>	62.5	$^\circ C/W$



# AP4959GM

## 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	$V_{GS}=0V, I_D=-250\mu A$	-16	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to $25^{\circ}\text{C}$ , $I_D=-1\text{mA}$	-	-0.01	-	$\text{V}/^{\circ}\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=-4.5V, I_D=-4A$	-	-	65	$\text{m}\Omega$
		$V_{GS}=-2.5V, I_D=-3A$	-	-	75	$\text{m}\Omega$
		$V_{GS}=-1.8V, I_D=-1A$	-	-	100	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-	-	-1.0	V
$g_{fs}$	Forward Transconductance	$V_{DS}=-5V, I_D=-4A$	-	10	-	S
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=-16V, V_{GS}=0V$	-	-	-1	$\mu A$
	Drain-Source Leakage Current ( $T_j=70^{\circ}\text{C}$ )	$V_{DS}=-12V, V_{GS}=0V$	-	-	-25	$\mu A$
$I_{GSS}$	Gate-Source Leakage	$V_{GS}=\pm 8V$	-	-	$\pm 100$	nA
$Q_g$	Total Gate Charge <sup>2</sup>	$I_D=-4A$	-	13	20	nC
$Q_{gs}$	Gate-Source Charge	$V_{DS}=-12V$	-	2	-	nC
$Q_{gd}$	Gate-Drain ("Miller") Charge	$V_{GS}=-4.5V$	-	4	-	nC
$t_{d(on)}$	Turn-on Delay Time <sup>2</sup>	$V_{DS}=-10V$	-	11	-	ns
$t_r$	Rise Time	$I_D=-1A$	-	19	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega, V_{GS}=-5V$	-	38	-	ns
$t_f$	Fall Time	$R_D=10\Omega$	-	22	-	ns
$C_{iss}$	Input Capacitance	$V_{GS}=0V$	-	920	1780	pF
$C_{oss}$	Output Capacitance	$V_{DS}=-15V$	-	175	-	pF
$C_{riss}$	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	150	-	pF

## Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{SD}$	Forward On Voltage <sup>2</sup>	$I_S=-1.7A, V_{GS}=0V$	-	-	-1.2	V

### Notes:

1. Pulse width limited by Max. junction temperature.
2. Pulse test
3. Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board ; 135  $^{\circ}\text{C}/\text{W}$  when mounted on min. copper pad.

THIS PRODUCT IS AN ELECTROSTATIC SENSITIVE, PLEASE HANDLE WITH CAUTION.

THIS PRODUCT HAS BEEN QUALIFIED FOR CONSUMER MARKET. APPLICATIONS OR USES AS CRITICAL COMPONENT IN LIFE SUPPORT DEVICE OR SYSTEM ARE NOT AUTHORIZED.

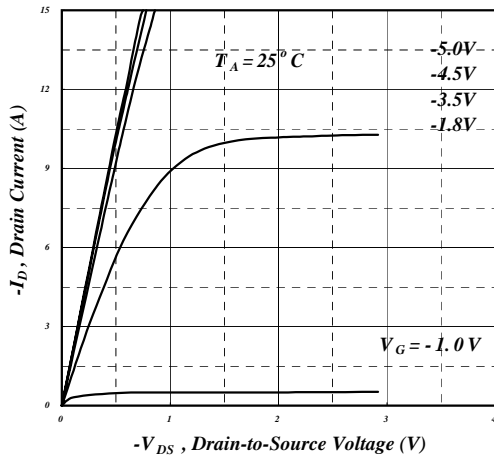


Fig 1. Typical Output Characteristics

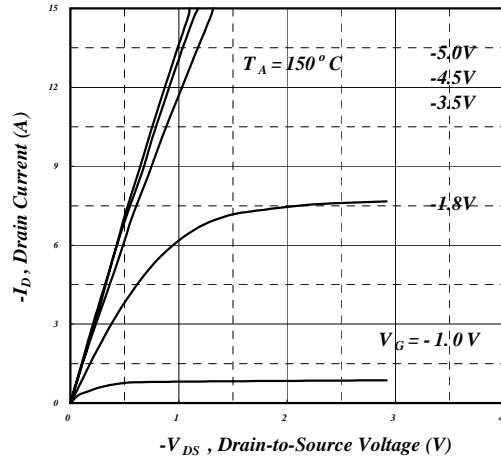


Fig 2. Typical Output Characteristics

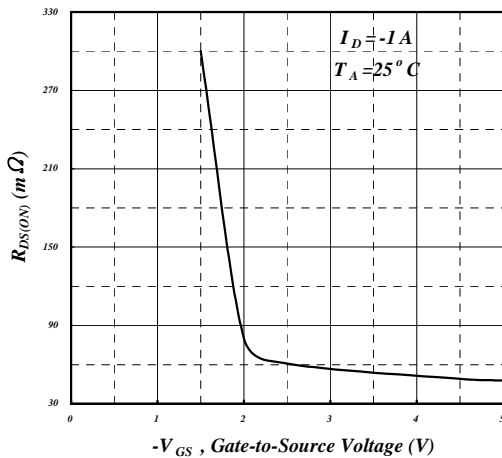


Fig 3. On-Resistance v.s. Gate Voltage

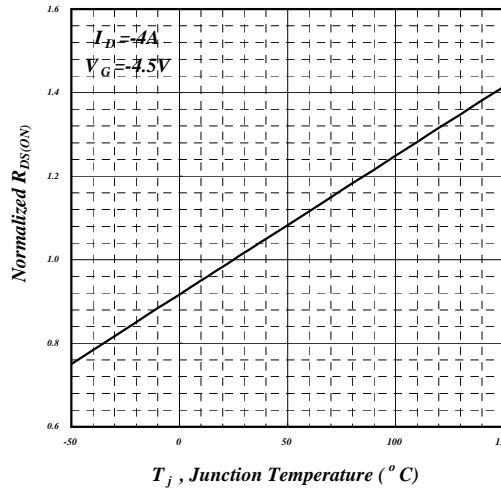


Fig 4. Normalized On-Resistance v.s. Junction Temperature

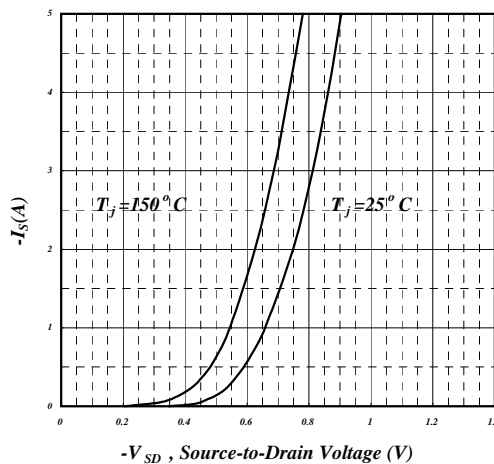


Fig 5. Forward Characteristic of Reverse Diode

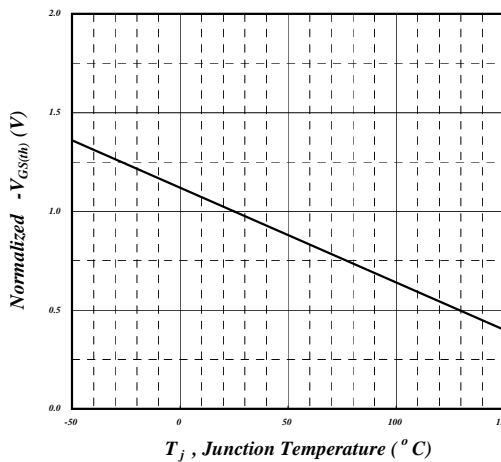


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

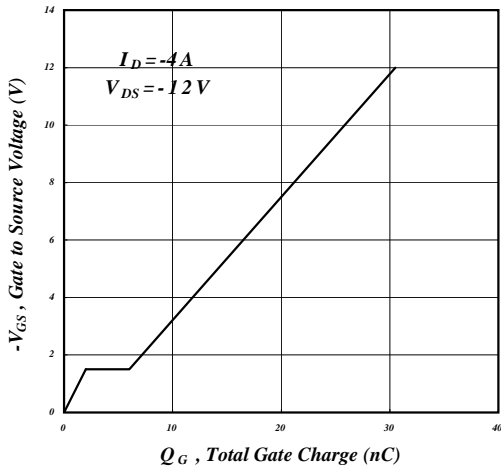


Fig 7. Gate Charge Characteristics

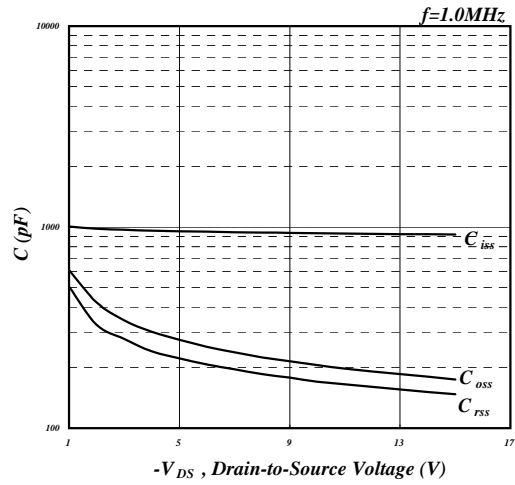


Fig 8. Typical Capacitance Characteristics

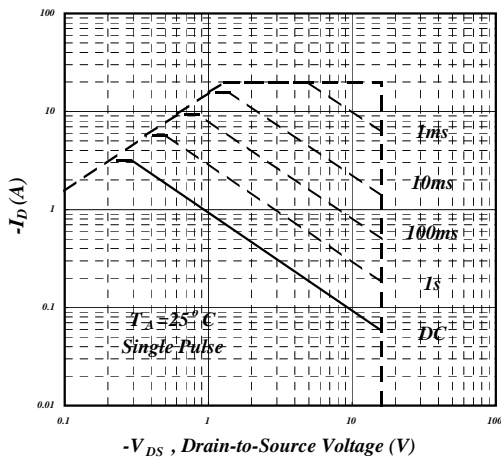


Fig 9. Maximum Safe Operating Area

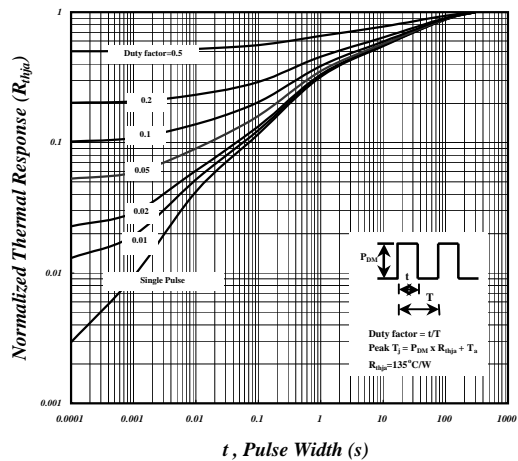


Fig 10. Effective Transient Thermal Impedance

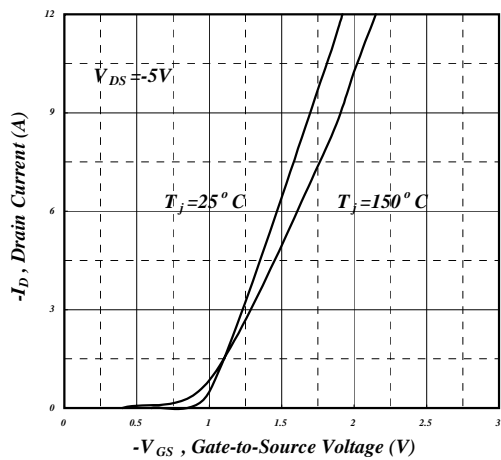


Fig 11. Transfer Characteristics

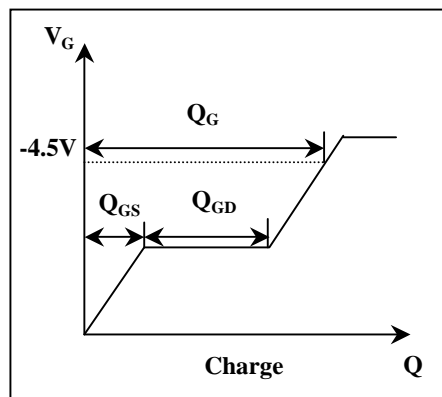


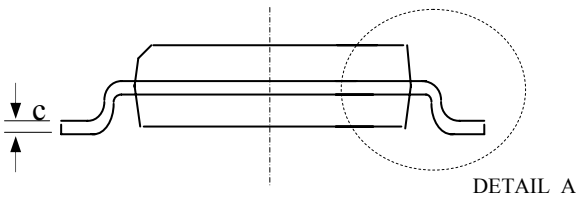
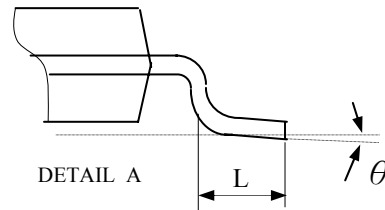
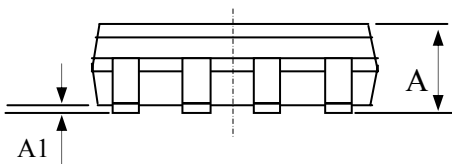
Fig 12. Gate Charge Waveform



## Package Outline : SO-8

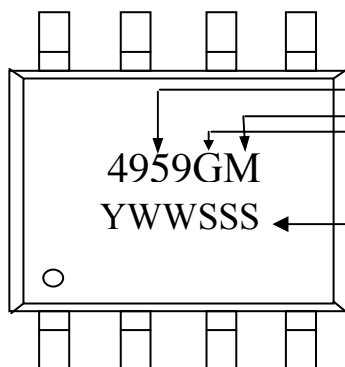


SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.10	0.18	0.25
B	0.33	0.41	0.51
C	0.19	0.22	0.25
D	4.80	4.90	5.00
E1	3.80	3.90	4.00
E	5.80	6.15	6.50
L	0.38	0.71	1.27
$\theta$	0	4.00	8.00
e	1.27 TYP		



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

## Part Marking Information & Packing : SO-8



Part Number    Package Code

meet Rohs requirement

4959GM  
YWWSSS

Date Code (YWWSSS)

Y : Last Digit Of The Year

WW : Week

SSS : Sequence