



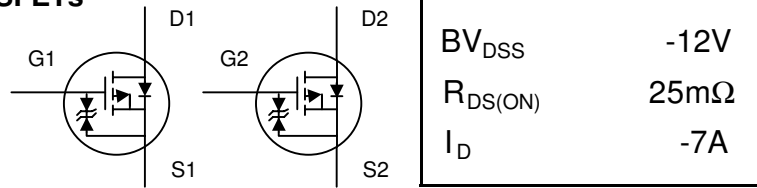
Dual P-channel Enhancement-mode Power MOSFET

Independent, Symmetrical Dual MOSFETs

Support 1.8V Gate Drive

Low On-resistance

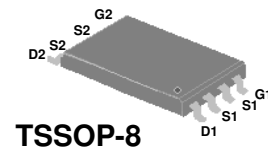
RoHS-compliant, halogen-free



Description

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

The TSSOP-8 package is widely used for commercial and industrial applications, where space is at a premium.



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-12	V
V_{GS}	Gate-Source Voltage	±8	V
I_D at $T_A=25\text{ }^\circ\text{C}$	Continuous Drain Current ³	-7.0	A
I_D at $T_A=70\text{ }^\circ\text{C}$	Continuous Drain Current ³	-5.0	A
I_{DM}	Pulsed Drain Current ¹	-30	A
P_D at $T_A=25\text{ }^\circ\text{C}$	Total Power Dissipation	1	W
	Linear Derating Factor	0.01	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	125	°C/W
Rthj-L	Maximum Thermal Resistance, Junction-lead	75	°C/W

Ordering Information

AP9923GEO-HF-3TR : in RoHS-compliant halogen-free TSSOP-8 shipped on tape and reel (3000pcs/reel)



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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-12	-	-	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=-4.5V, I_D=-7A$	-	-	25	m Ω
		$V_{GS}=-2.5V, I_D=-6A$	-	-	32	m Ω
		$V_{GS}=-1.8V, I_D=-5A$	-	-	48	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.3	-	-1	V
g_{fs}	Forward Transconductance	$V_{DS}=-5V, I_D=-7A$	-	7	-	S
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-12V, V_{GS}=0V$	-	-	-1	μA
	Drain-Source Leakage Current ($T_j=70^\circ\text{C}$)	$V_{DS}=-9.6V, V_{GS}=0V$	-	-	-10	μA
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 8V, V_{DS}=0V$	-	-	± 30	μA
Q_g	Total Gate Charge ²	$I_D=-7A$	-	28	45	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=-6V$	-	3	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=-4.5V$	-	8	-	nC
$t_{d(on)}$	Turn-on Delay Time ²	$V_{DS}=-6V$	-	12	-	ns
t_r	Rise Time	$I_D=-5A$	-	55	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega, V_{GS}=-5V$	-	75	-	ns
t_f	Fall Time	$R_D=1.2\Omega$	-	100	-	ns
C_{iss}	Input Capacitance	$V_{GS}=0V$	-	2250	3600	pF
C_{oss}	Output Capacitance	$V_{DS}=-6V$	-	635	-	pF
C_{rss}	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	565	-	pF
R_g	Gate Resistance	$f=1.0\text{MHz}$	-	5	7.5	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage ²	$T_j=25^\circ\text{C}, I_S=-0.84A, V_{GS}=0V$	-	-	-1.2	V
t_{rr}	Reverse Recovery Time ²	$I_S=-7A, V_{GS}=0V,$	-	61	-	ns
Q_{rr}	Reverse Recovery Charge	$di/dt=100A/\mu s$	-	56	-	nC

Notes:

1. Pulse width limited by the maximum junction temperature.
2. Pulse test - pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
3. Surface mounted on 1 in² copper pad of FR4 board; 208 °C/W when mounted on minimum 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.

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Typical Electrical Characteristics

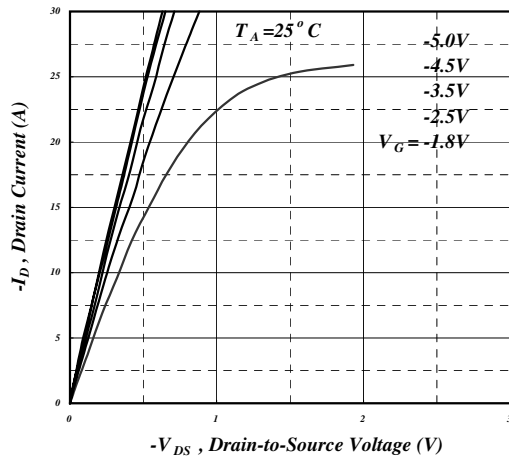


Fig 1. Typical Output Characteristics

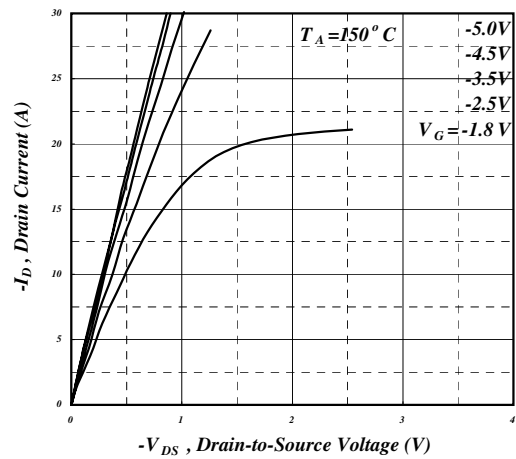


Fig 2. Typical Output Characteristics

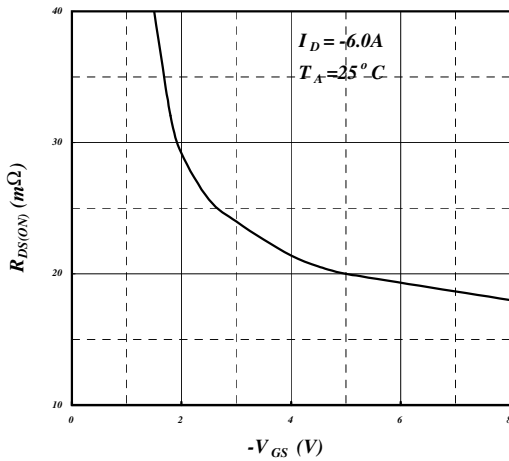


Fig 3. On-Resistance vs. Gate Voltage

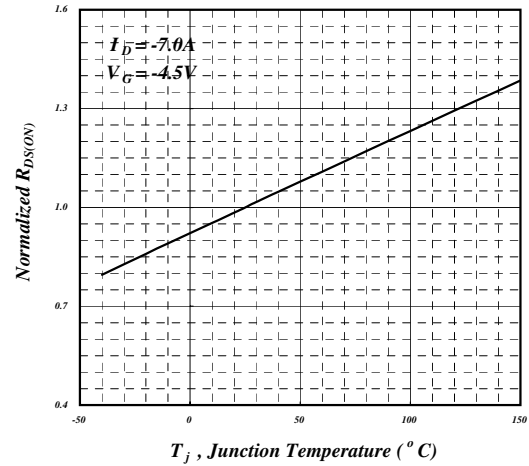


Fig 4. Normalized On-Resistance vs. Junction Temperature

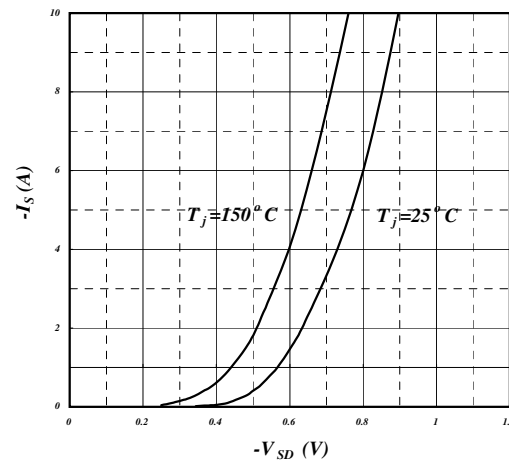


Fig 5. Forward Characteristic of Reverse Diode

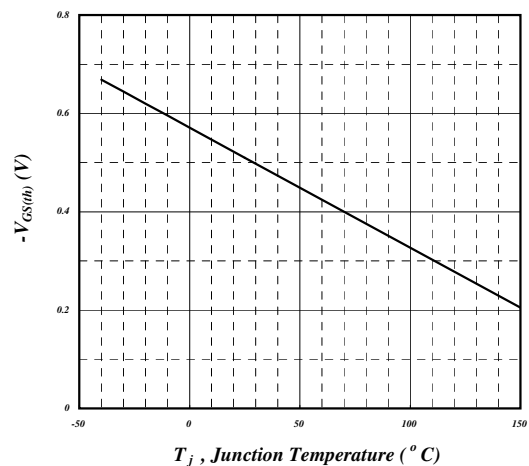


Fig 6. Gate Threshold Voltage vs. Junction Temperature



Typical Electrical Characteristics (cont.)

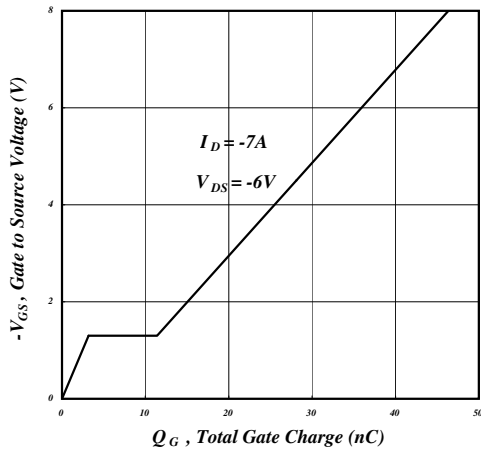


Fig 7. Gate Charge Characteristics

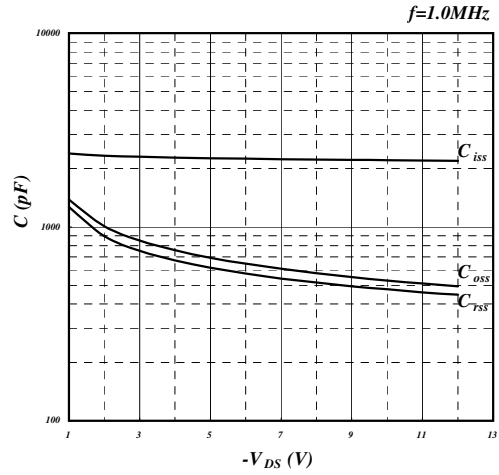


Fig 8. Typical Capacitance Characteristics

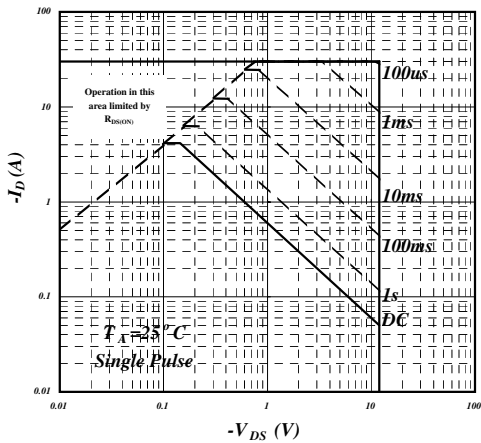


Fig 9. Maximum Safe Operating Area

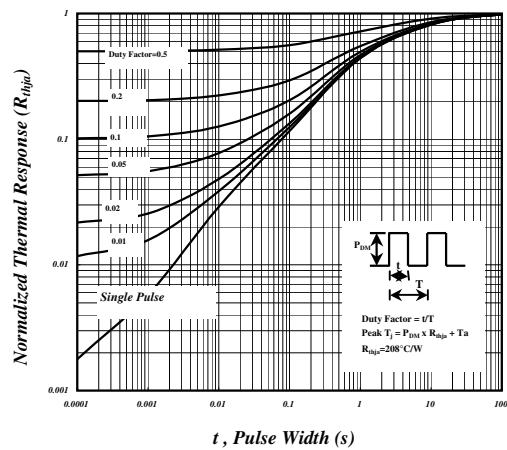


Fig 10. Effective Transient Thermal Impedance

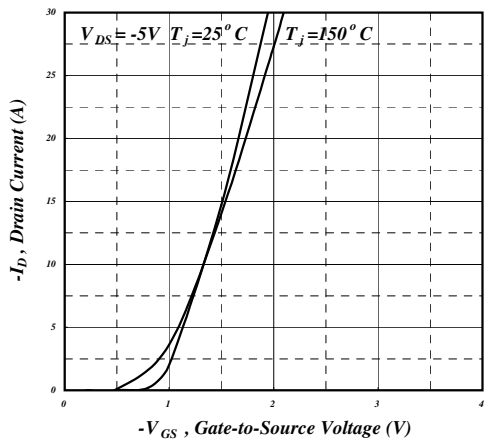


Fig 11. Transfer Characteristics

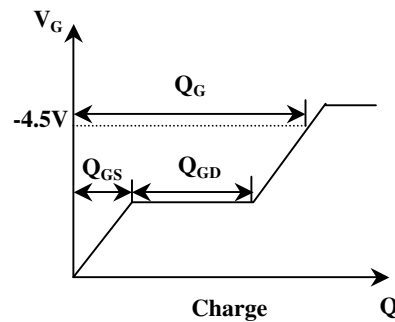
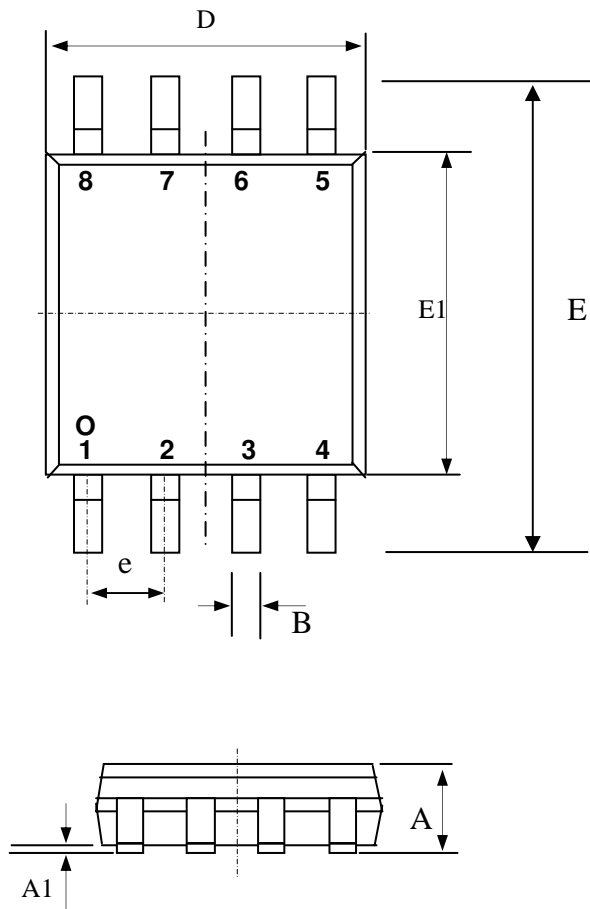


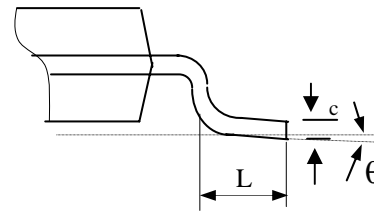
Fig 12. Gate Charge Waveform



Package Dimensions: TSSOP-8

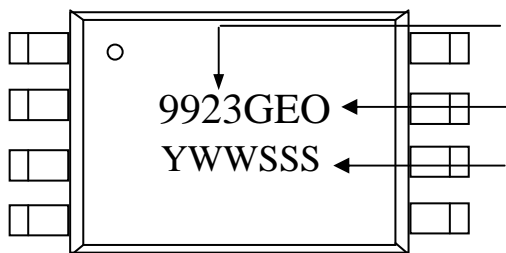


SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	---	---	1.20
A1	0.05	---	0.15
B	0.19	---	0.30
C	---	0.127	---
D	2.90	3.00	3.10
E	6.20	6.40	6.60
E1	4.30	4.40	4.50
L	0.45	0.60	0.75
e	0.65 REF.		
θ	0°	---	8°



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

Marking Information:



Product: AP9923

GEO = RoHS-compliant halogen-free TSSOP-8 with Gate ESD protection

YWWSSS = Date/lot code

YWW = Year and work week of manufacture.

SSS = Lot code information.