



**Advanced Power
Electronics Corp.**

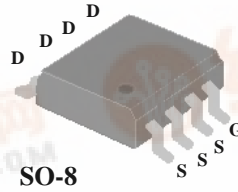
AP4409AGEM

RoHS-compliant Product

P-CHANNEL ENHANCEMENT MODE

POWER MOSFET

- ▼ Simple Drive Requirement
- ▼ Low On-resistance
- ▼ Fast Switching Characteristic

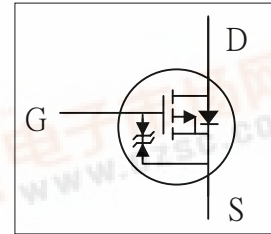


BV_{DSS}	-35V
$R_{DS(ON)}$	7.5m Ω
I_D	-14.5A

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 SO-8 package is widely preferred for commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-35	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_A = 25^\circ\text{C}$	Continuous Drain Current ^{3a}	-14.5	A
$I_D @ T_A = 70^\circ\text{C}$	Continuous Drain Current ^{3a}	-12	A
I_{DM}	Pulsed Drain Current ¹	-50	A
$P_D @ T_A = 25^\circ\text{C}$	Total Power Dissipation	2.5	W
	Linear Derating Factor	0.02	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
Rthj-a	Maximum Thermal Resistance, Junction-ambient ^{3a}	50	$^\circ\text{C}/\text{W}$



AP4409AGEM

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

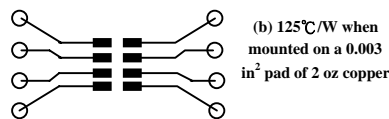
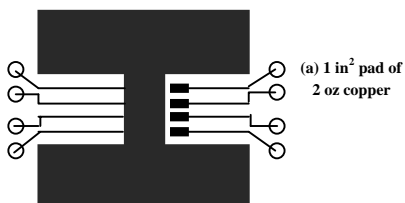
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-35	-	-	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=-10V, I_D=-7A$	-	-	7.5	$m\Omega$
		$V_{GS}=-4V, I_D=-7A$	-	-	15	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1	-	-3	V
g_{fs}	Forward Transconductance	$V_{DS}=-10V, I_D=-7A$	-	7	-	S
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-30V, V_{GS}=0V$	-	-	-10	μA
		Drain-Source Leakage Current ($T_j=70^\circ\text{C}$)	$V_{DS}=-24V, V_{GS}=0V$	-	-	-25
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 20V$	-	-	± 30	μA
Q_g	Total Gate Charge ²	$I_D=-14A$	-	58	90	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=-30V$	-	7	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=-4.5V$	-	37	-	nC
$t_{d(on)}$	Turn-on Delay Time ²	$V_{DS}=-15V$	-	15	-	ns
t_r	Rise Time	$I_D=-1A$	-	13	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega, V_{GS}=-10V$	-	76	-	ns
t_f	Fall Time	$R_D=15\Omega$	-	60	-	ns
C_{iss}	Input Capacitance	$V_{GS}=0V$	-	4100	6600	pF
C_{oss}	Output Capacitance	$V_{DS}=-25V$	-	640	-	pF
C_{rss}	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	530	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage ²	$I_S=-14A, V_{GS}=0V$	-	-	-1.3	V
t_{rr}	Reverse Recovery Time ²	$I_S=-14A, V_{GS}=0V,$	-	46	-	ns
Q_{rr}	Reverse Recovery Charge	$dI/dt=100A/\mu s$	-	44	-	nC

Notes:

1. Pulse width limited by Max. junction temperature.
2. Pulse test
3. Surface mounted on 1 in² copper pad of FR4 board (a), $t \leq 10\text{sec}$



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.

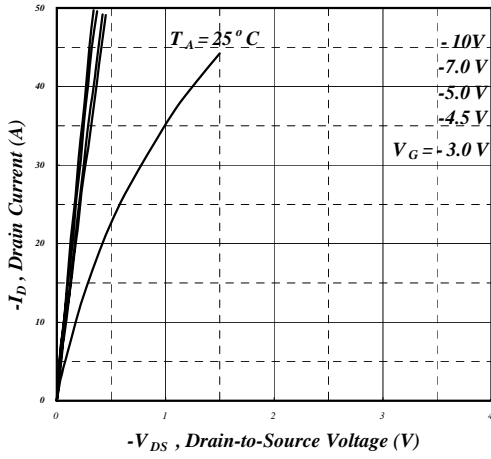


Fig 1. Typical Output Characteristics

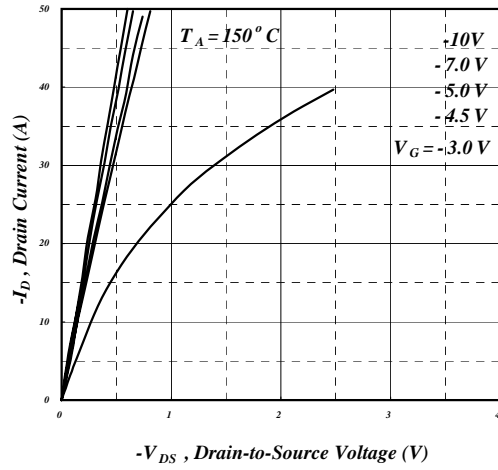


Fig 2. Typical Output Characteristics

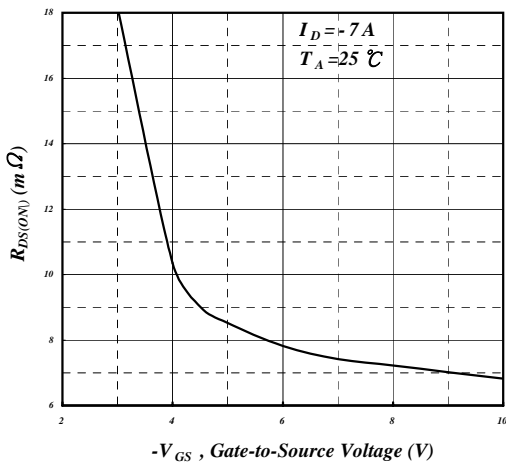


Fig 3. On-Resistance v.s. Gate Voltage

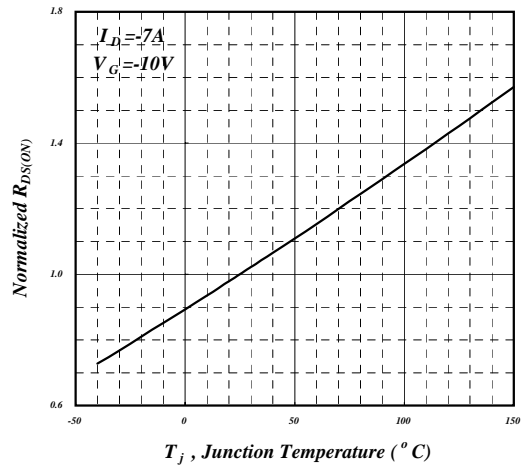


Fig 4. Normalized On-Resistance v.s. Junction Temperature

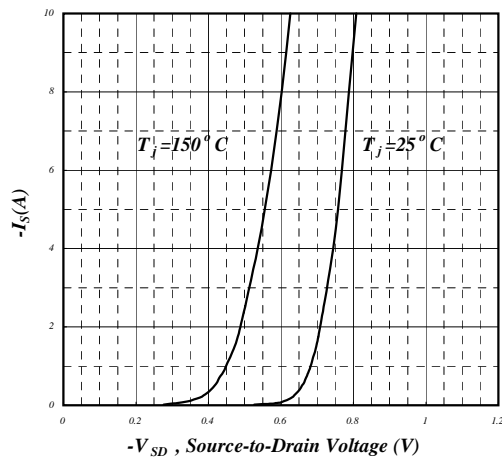


Fig 5. Forward Characteristic of Reverse Diode

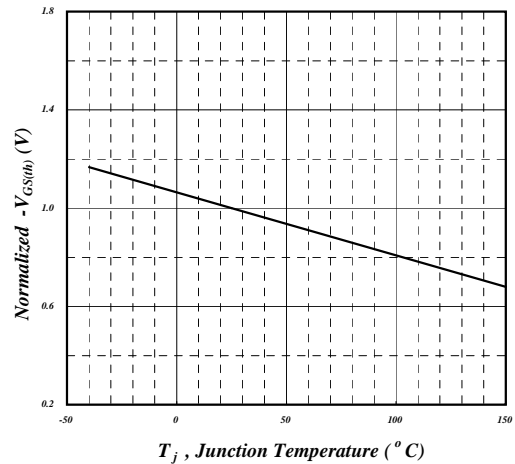


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

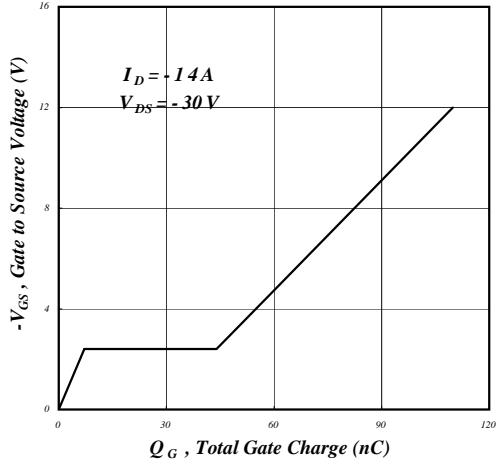


Fig 7. Gate Charge Characteristics

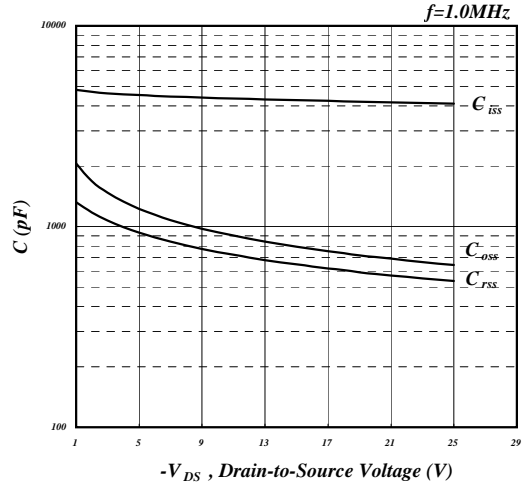


Fig 8. Typical Capacitance Characteristics

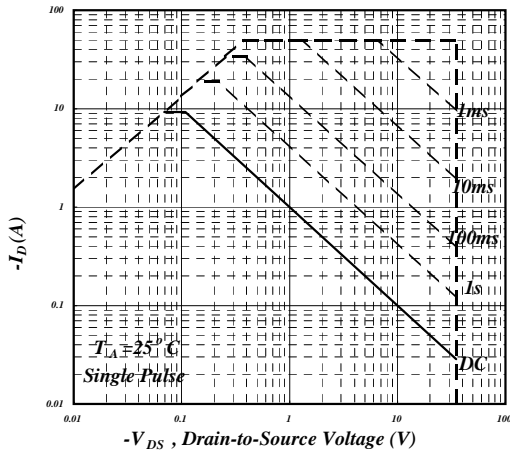


Fig 9. Maximum Safe Operating Area

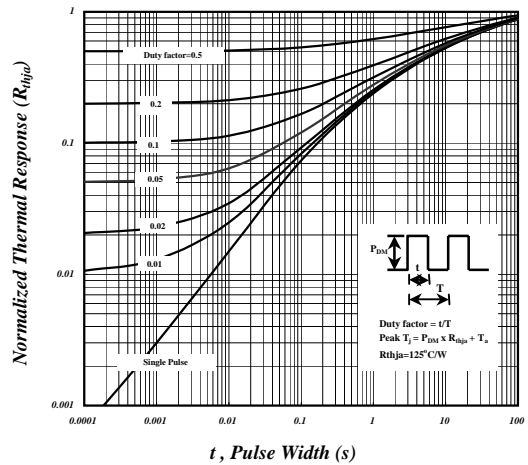


Fig 10. Effective Transient Thermal Impedance

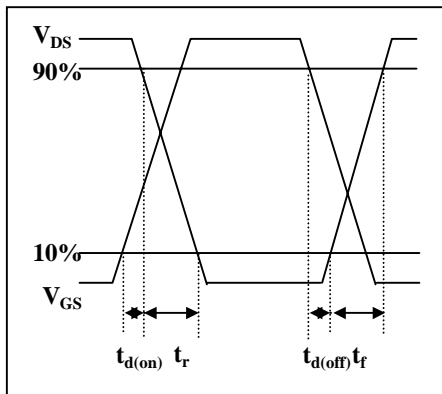


Fig 11. Switching Time Waveform

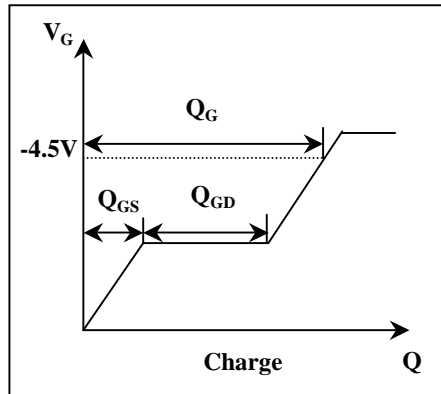
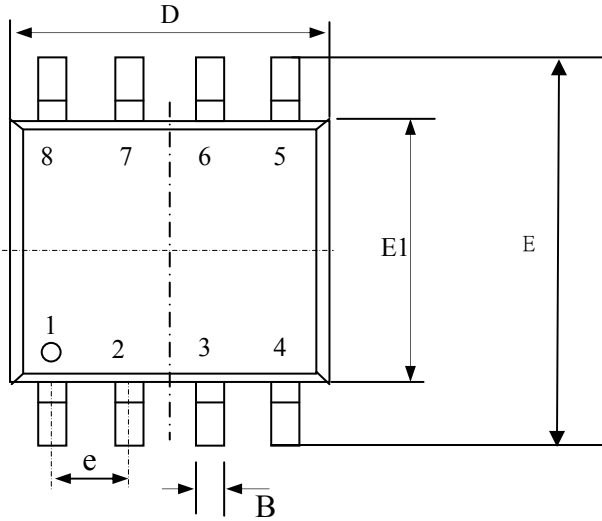


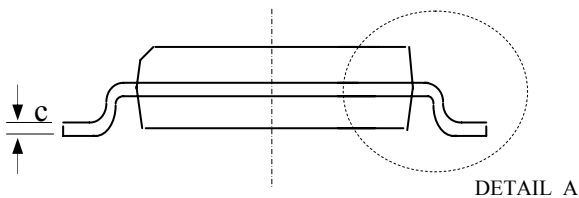
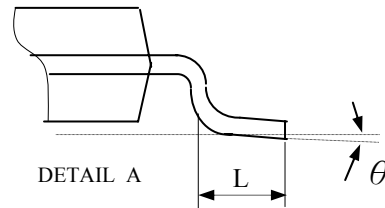
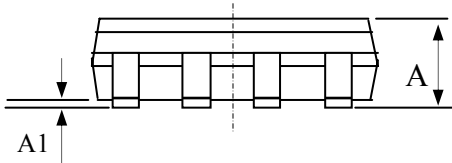
Fig 12. Gate Charge Waveform



Package Outline : SO-8

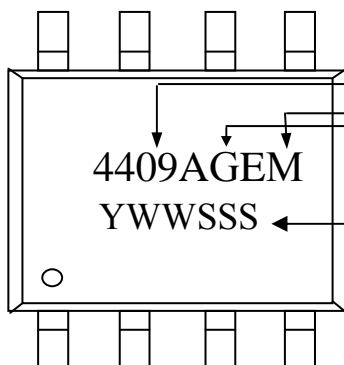


SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.10	0.18	0.25
B	0.33	0.41	0.51
C	0.19	0.22	0.25
D	4.80	4.90	5.00
E1	3.80	3.90	4.00
E	5.80	6.15	6.50
L	0.38	0.71	1.27
θ	0	4.00	8.00
e	1.27 TYP		



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

Date Code (YWWSSS)

Y : Last Digit Of The Year

WW : Week

SSS : Sequence