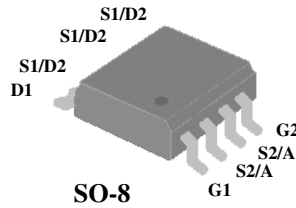




Asymmetric Dual N-channel Power MOSFET with Integrated Schottky Diode

- Simple Drive Requirement
- Ideal for DC-DC Converters
- Fast Switching Performance
- RoHS-compliant

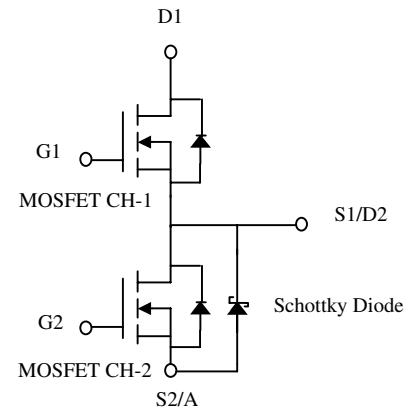


CH-1	BV_{DSS}	30V
	$R_{DS(ON)}$	22m Ω
	I_D	6.7A
CH-2	BV_{DSS}	30V
	$R_{DS(ON)}$	13m Ω
	I_D	11.5A

Description

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

The AP4816GSM-3 is in a standard SO-8 package, which is widely used for commercial and industrial surface-mount applications, and is well suited for applications such as DC and servo motor drives.



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		Channel-1	Channel-2	
V_{DS}	Drain-Source Voltage	30	30	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
I_D at $T_A=25^\circ\text{C}$	Continuous Drain Current ³	6.7	11.5	A
I_D at $T_A=70^\circ\text{C}$	Continuous Drain Current ³	5.3	9.2	A
I_{DM}	Pulsed Drain Current ¹	30	40	A
P_D at $T_A=25^\circ\text{C}$	Total Power Dissipation	1.4	2.4	W
	Linear Derating Factor	0.01	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		Units
		Typ.	Max.	
Rthj-a (CH-1)	Thermal Resistance Junction-ambient ³	70	90	$^\circ\text{C}/\text{W}$
Rthj-a (CH-2)	Thermal Resistance Junction-ambient ³	42	53	$^\circ\text{C}/\text{W}$
Rthj-a (Schottky)	Thermal Resistance Junction-ambient ³	52	60	$^\circ\text{C}/\text{W}$

Ordering Information

AP4816GSM-3TR RoHS-compliant SO-8, shipped on tape and reel (3000 pcs/reel)



MOSFET CH-1 Electrical Specifications 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	30	-	-	V
ΔBV _{DSS} /ΔT _j	Breakdown Voltage Temperature Coefficient	Reference to 25 °C, I _D =1mA	-	0.03	-	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =6A	-	-	22	mΩ
		V _{GS} =4.5V, I _D =5A	-	-	30	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 =6A	-	10	-	S
I _{DSS}	Drain-Source Leakage Current (T _j =25°C)	V _{DS} =30V, V _{GS} =0V	-	-	1	uA
	Drain-Source Leakage Current (T _j =70°C)	V _{DS} =24V, V _{GS} =0V	-	-	25	uA
I _{GSS}	Gate-Source Leakage	V _{GS} =±20V	-	-	±100	nA
Q _g	Total Gate Charge ²	I _D =6A	-	11	18	nC
Q _{gs}	Gate-Source Charge	V _{DS} =24V	-	3	-	nC
Q _{gd}	Gate-Drain ("Miller") Charge	V _{GS} =4.5V	-	7	-	nC
t _{d(on)}	Turn-on Delay Time ²	V _{DS} =15V	-	9	-	ns
t _r	Rise Time	I _D =1A	-	7	-	ns
t _{d(off)}	Turn-off Delay Time	R _G =3.3Ω, V _{GS} =10V	-	22	-	ns
t _f	Fall Time	R _D =15Ω	-	7	-	ns
C _{iss}	Input Capacitance	V _{GS} =0V	-	780	1250	pF
C _{oss}	Output Capacitance	V _{DS} =25V	-	180	-	pF
C _{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	140	-	pF
R _g	Gate Resistance	f=1.0MHz	-	1.25	-	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V _{SD}	Forward On Voltage ²	I _S =1.2A, V _{GS} =0V	-	-	1.2	V
t _{rr}	Reverse Recovery Time ²	I _S =6A, V _{GS} =0V	-	21	-	ns
Q _{rr}	Reverse Recovery Charge	dI/dt=100A/μs	-	15	-	nC

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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MOSFET CH-2 Electrical Specifications at T_J=25°C (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	Reference to 25°C, $I_D=1mA$	-	0.03	-	V/°C
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V, I_D=11A$	-	-	13	mΩ
		$V_{GS}=4.5V, I_D=8A$	-	-	18.5	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	-	3	V
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=11A$	-	15	-	S
I_{DSS}	Drain-Source Leakage Current (T _J =25°C)	$V_{DS}=30V, V_{GS}=0V$	-	-	100	μA
	Drain-Source Leakage Current (T _J =70°C)	$V_{DS}=24V, V_{GS}=0V$	-	-	1	mA
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 20V$	-	-	±100	nA
Q_g	Total Gate Charge ²	$I_D=8A$	-	20	30	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=24V$	-	5	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=4.5V$	-	12	-	nC
$t_{d(on)}$	Turn-on Delay Time ²	$V_{DS}=15V$	-	12	-	ns
t_r	Rise Time	$I_D=1A$	-	8	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega, V_{GS}=10V$	-	31	-	ns
t_f	Fall Time	$R_D=15\Omega$	-	12	-	ns
C_{iss}	Input Capacitance	$V_{GS}=0V$	-	1450	2320	pF
C_{oss}	Output Capacitance	$V_{DS}=25V$	-	320	-	pF
C_{rss}	Reverse Transfer Capacitance	$f=1.0MHz$	-	230	-	pF
R_g	Gate Resistance	$f=1.0MHz$	-	1.5	-	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage ²	$I_S=1A, V_{GS}=0V$	-	-	0.5	V
t_{rr}	Reverse Recovery Time ²	$I_S=8A, V_{GS}=0V$	-	27	-	ns
Q_{rr}	Reverse Recovery Charge	$dI/dt=100A/\mu s$	-	18	-	nC

Notes:

1. Pulse width limited by maximum junction temperature.
2. Pulse test
3. Surface mounted on 1 in² copper pad of FR4 board, t ≤ 10 sec.

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Forward Voltage Drop	$I_F=1.0\text{A}$	-	0.47	0.5	V
I_{rm}	Maximum Reverse Leakage Current	$V_r=30\text{V}$	-	0.004	0.2	mA
	Maximum Reverse Leakage Current	$V_r=30\text{V}, T_j=100^\circ\text{C}$	-	0.5	1	mA
C_T	Junction Capacitance	$V_r=10\text{V}$	-	66	-	pF



MOSFET CH-1 Electrical Characteristics

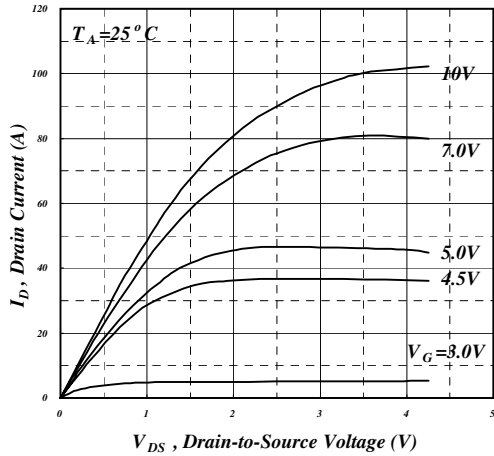


Fig 1. Typical Output Characteristics

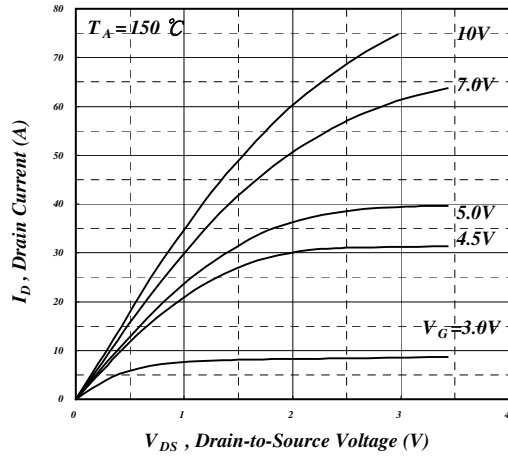


Fig 2. Typical Output Characteristics

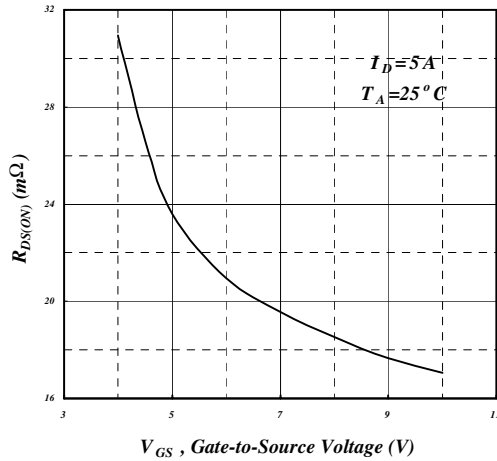


Fig 3. On-Resistance vs. Gate Voltage

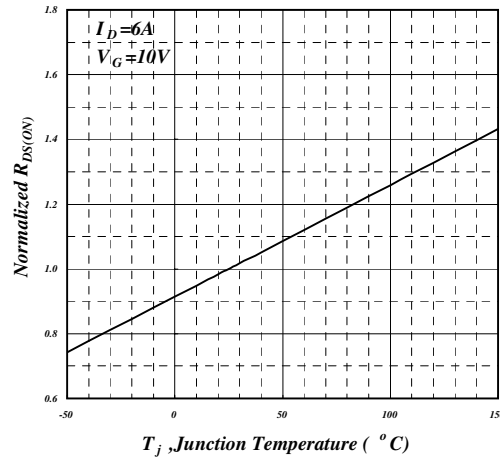


Fig 4. Normalized On-Resistance vs. Junction Temperature

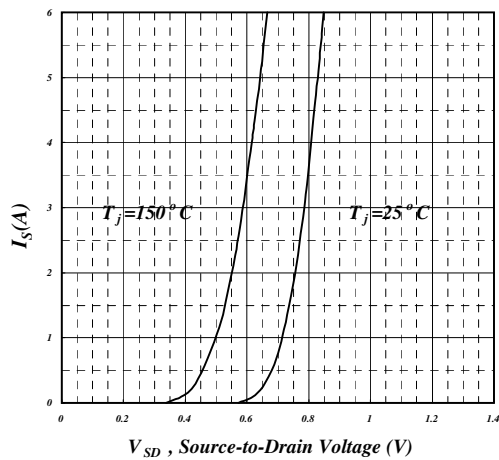


Fig 5. Forward Characteristic of Reverse Diode

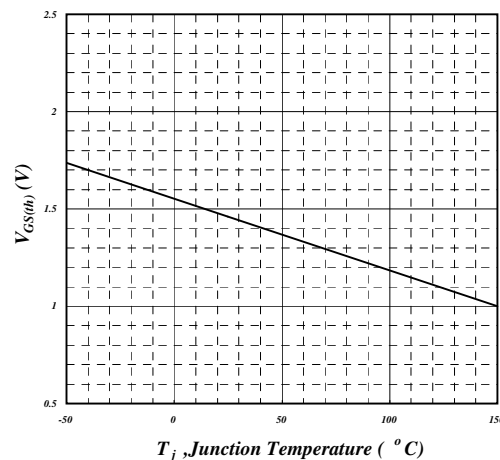


Fig 6. Gate Threshold Voltage vs. Junction Temperature



MOSFET CH-1 Electrical Characteristics (cont.)

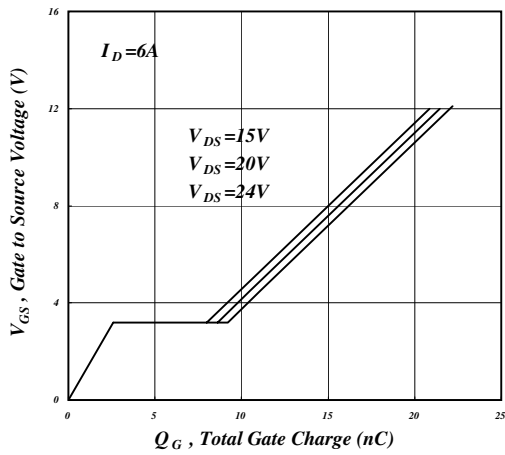


Fig 7. Gate Charge Characteristics

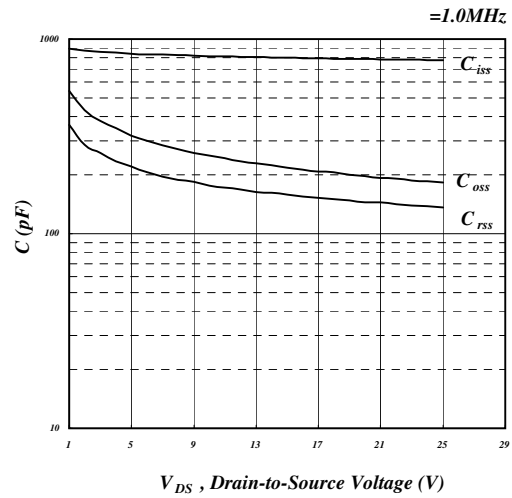


Fig 8. Typical Capacitance Characteristics

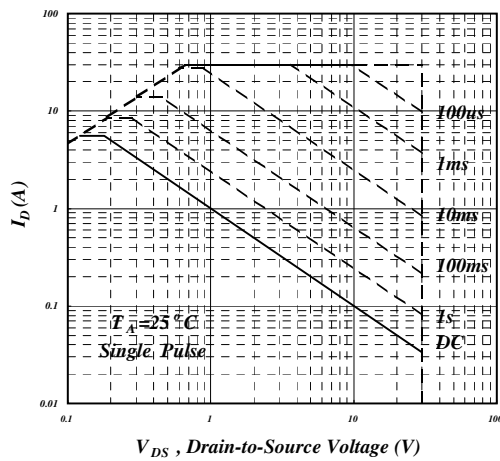


Fig 9. Maximum Safe Operating Area

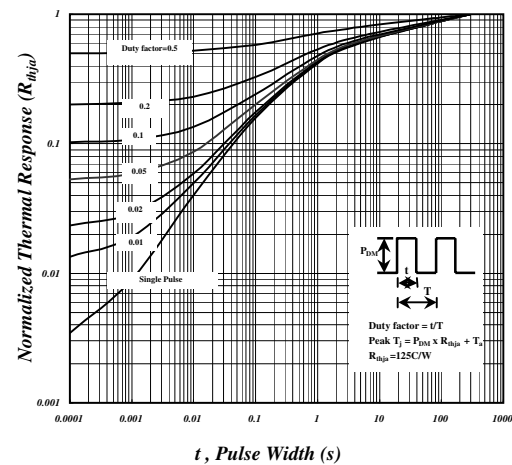


Fig 10. Effective Transient Thermal Impedance

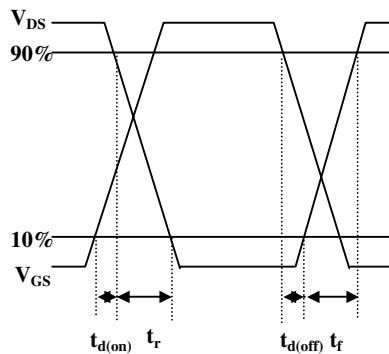


Fig 11. Switching Time Waveforms

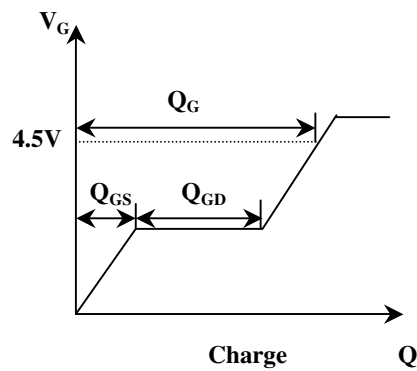


Fig 12. Gate Charge Waveform



MOSFET CH-2 Electrical Characteristics

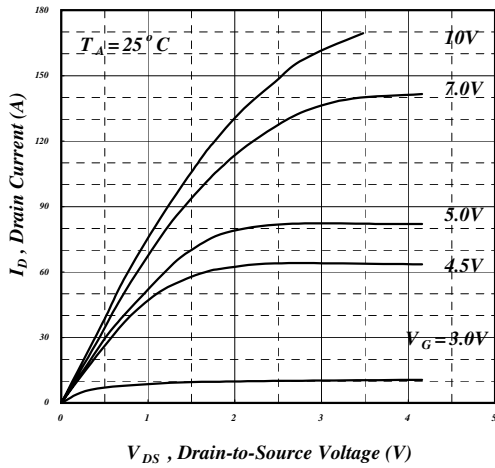


Fig 1. Typical Output Characteristics

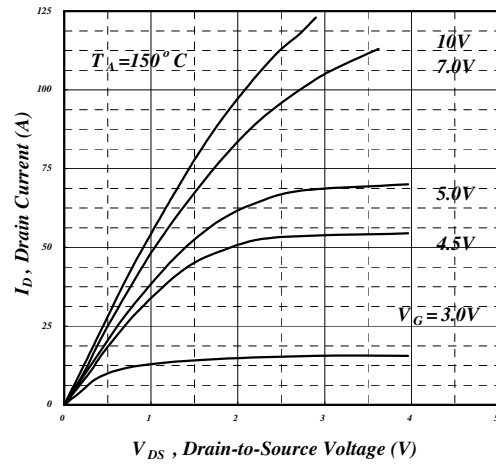


Fig 2. Typical Output Characteristics

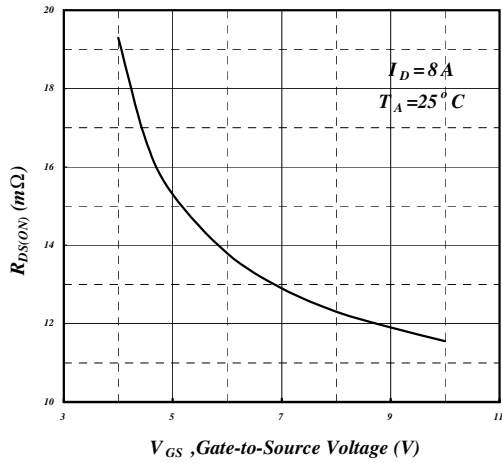


Fig 3. On-Resistance vs. Gate Voltage

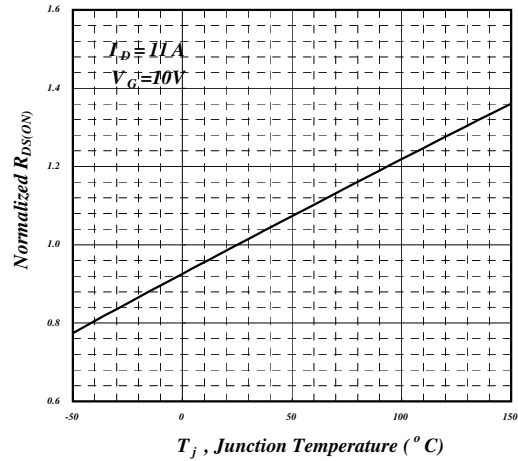


Fig 4. Normalized On-Resistance vs. Junction Temperature

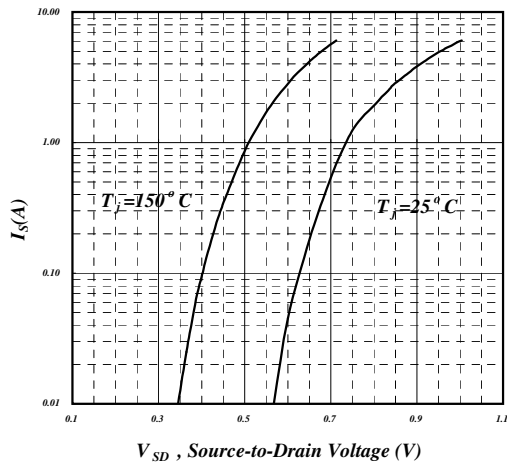


Fig 5. Forward Characteristic of Reverse Diode

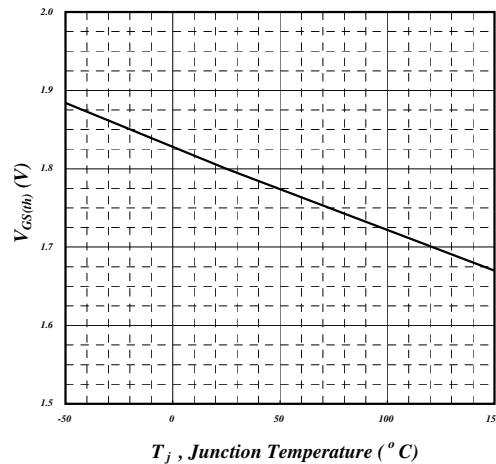


Fig 6. Gate Threshold Voltage vs. Junction Temperature



MOSFET CH-2 Electrical Characteristics (cont.)

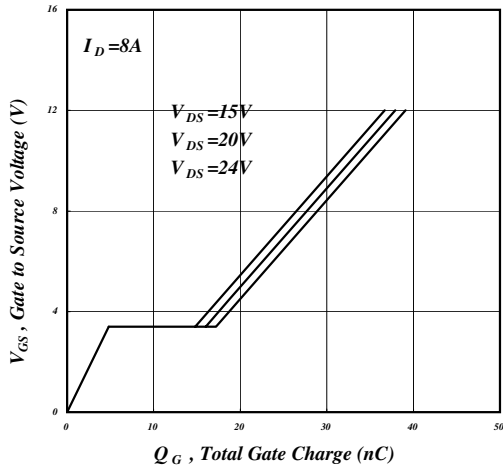


Fig 7. Gate Charge Characteristics

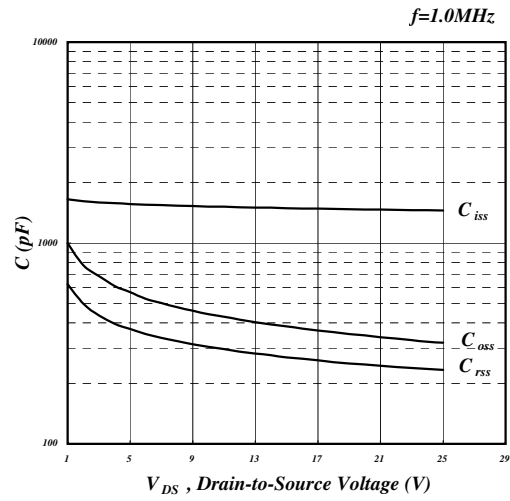


Fig 8. Typical Capacitance Characteristics

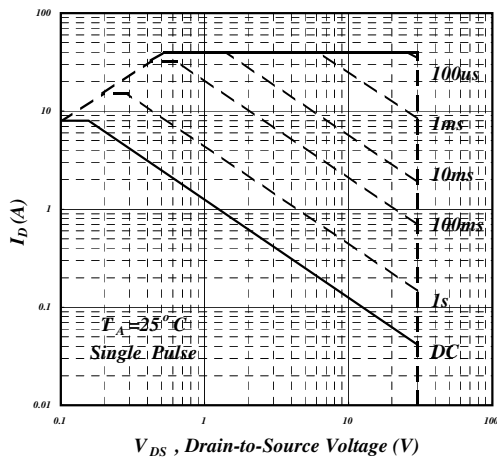


Fig 9. Maximum Safe Operating Area

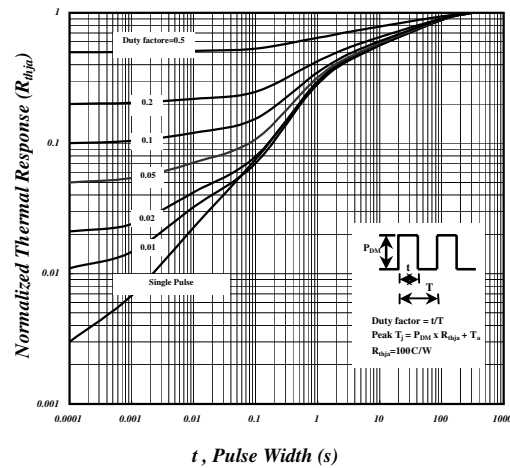


Fig 10. Effective Transient Thermal Impedance

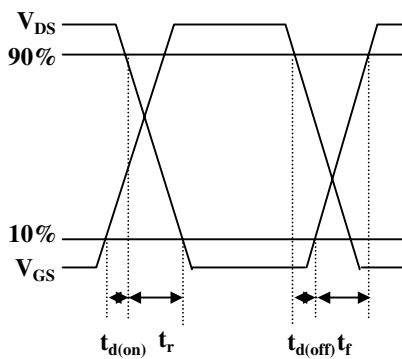


Fig 11. Switching Time Waveforms

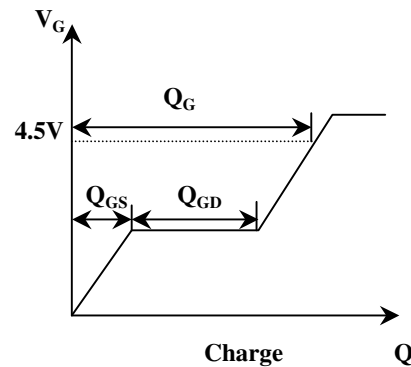


Fig 12. Gate Charge Waveform



Schottky Diode Electrical Characteristics

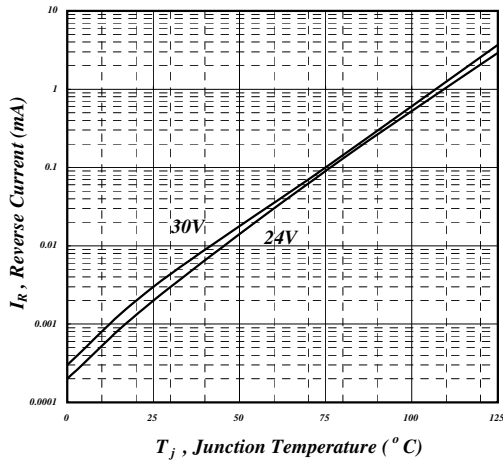


Fig 1. Reverse Current vs. Junction Temperature

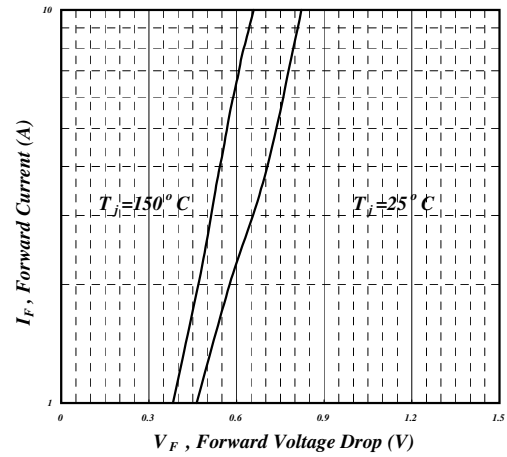


Fig 2. Typical Forward Characteristics

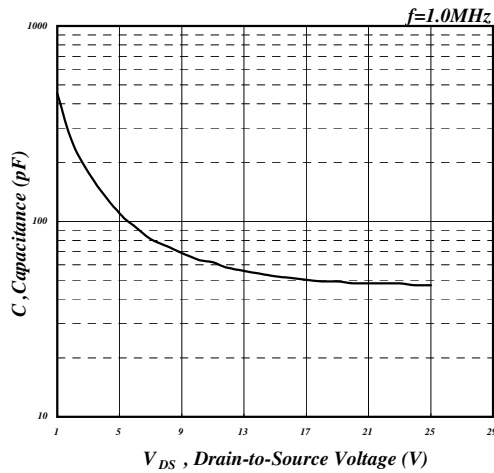
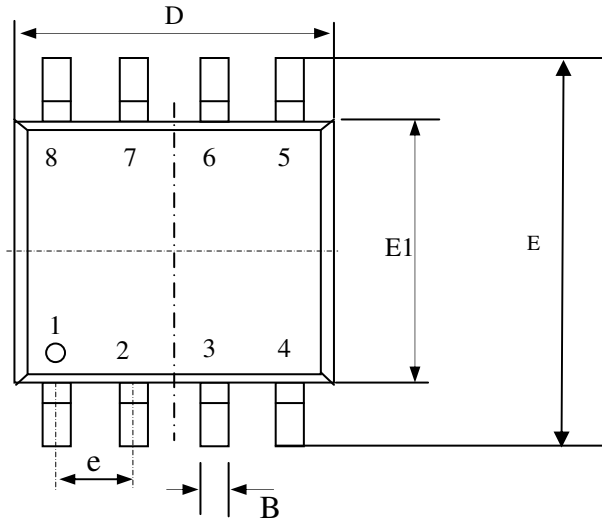


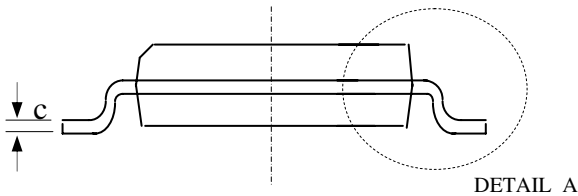
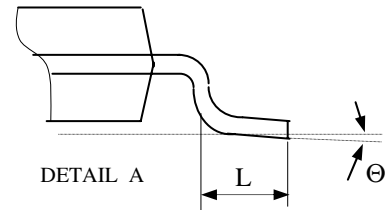
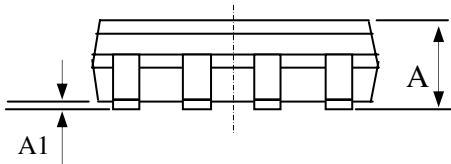
Fig 3. Typical Junction Capacitance



Package Dimensions: SO-8

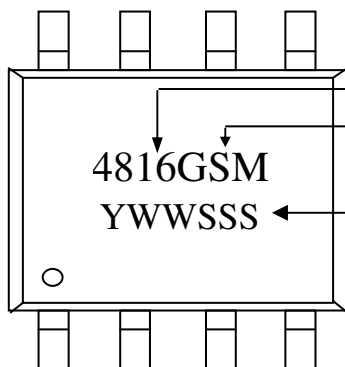


SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.10	0.18	0.25
B	0.33	0.41	0.51
C	0.19	0.22	0.25
D	4.80	4.90	5.00
E1	3.80	3.90	4.00
E	5.80	6.15	6.50
L	0.38	0.71	1.27
θ	0	4.00	8.00
e	1.27 TYP		



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

Marking Information: SO-8



Product: AP4816
 Package: GSM = RoHS-compliant SO-8 with Schottky diode
 Date/lot code (YWWSSS)
 Y: Last digit of the year
 WW: Work week
 SSS: Lot code sequence