Alfa-MOS Technology

AFP4599W

40V N & P Pair Enhancement Mode MOSFET

General Description

AFP4599W, N & P Pair enhancement mode MOSFET, uses Advanced Trench Technology to provide excellent RDS(ON), low gate charge. These devices are particularly suited for low voltage power management, and low in-line power loss are needed in commercial industrial surface mount applications.

Features

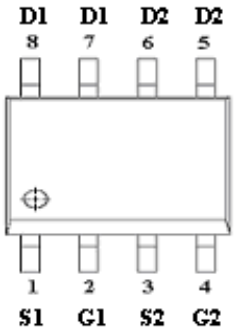
N-Channel

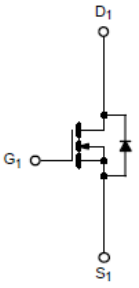
- I_D= 8A,$R_{DS(ON)}$= 22mΩ@V_{GS}=10V
- I_D= 6A,$R_{DS(ON)}$= 28mΩ@V_{GS}=4.5V

P-Channel

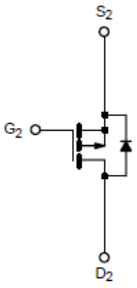
- I_D= -7.2A,$R_{DS(ON)}$= 42mΩ@V_{GS}= -10V
- I_D= -6.2A,$R_{DS(ON)}$= 60mΩ@V_{GS}= -4.5V

Pin Description (SOP-8P)

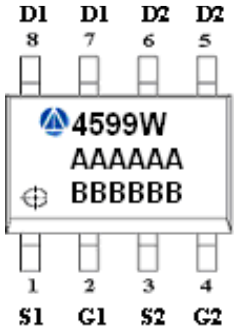




N-Channel MOSFET



P-Channel MOSFET



Application

- Low Current DC/DC Conversion
- Load Switch
- CCFL Inverter
- Power Management in Notebook Computer

Pin Define

Pin	Symbol	Description
1	S1	Source 1
2	G1	Gate 1
3	S2	Source 2
4	G2	Gate 2
5	D2	Drain 2
6	D2	Drain 2
7	D1	Drain 1
8	D1	Drain 1

Ordering Information

Part Ordering No.	Part Marking	Package	Unit	Quantity
AFC4599WS8RG	4599W	SOP-8P	Tape & Reel	2500 EA

※ A Lot code
※ B Date code
※ AFC4599WS8RG : 13" Tape & Reel ; Pb- Free ; Halogen –Free

Absolute Maximum Ratings (N-Channel)

(T_A=25℃ Unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	40	V
Gate –Source Voltage		V_{GSS}	±20	V
Continuous Drain Current(T_J=150℃)	T_A=25℃	I_D	8	A
	T_A=70℃		6	
Pulsed Drain Current		I_{DM}	25	A
Continuous Source Current(Diode Conduction)		I_S	1.5	A
Power Dissipation	T_A=25℃	P_D	2.8	W
	T_A=70℃		1.8	
Operating Junction Temperature		T_J	150	℃
Storage Temperature Range		T_{STG}	-55/150	℃
Thermal Resistance-Junction to Ambient		$R_{\theta JA}$	62.5	℃/W

Electrical Characteristics (N-Channel)

(T_A=25℃ Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V,I_D=250uA	40			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250uA	1.0		3.0	
Gate Leakage Current	I_{GSS}	V_{DS}=0V,V_{GS}=±20V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=32V,V_{GS}=0V			1	uA
		V_{DS}=32V,V_{GS}=0V T_J=85℃			10	
On-State Drain Current	$I_{D(on)}$	V_{DS}≧5V,V_{GS}=10V	20			A
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS}=10V,I_D=8A		16	22	mΩ
		V_{GS}=4.5V,I_D=6A		20	28	
Forward Transconductance	g_{FS}	V_{DS}=15V,I_D=5.0A		25		S
Diode Forward Voltage	V_{SD}	I_S=2A,V_{GS}=0V		0.85	1.2	V
Dynamic						
Total Gate Charge	Q_g	V_{DS}=20V,V_{GS}=4.5V I_D= 5A		10	14	nC
Gate-Source Charge	Q_{gs}			2.8		
Gate-Drain Charge	Q_{gd}			3.2		
Input Capacitance	C_{iss}	V_{DS}=20V,V_{GS}=0V f=1MHz		850		pF
Output Capacitance	C_{oss}			110		
Reverse Transfer Capacitance	C_{rss}			75		
Turn-On Time	$t_{d(on)}$	V_{DD}=20V,R_L=4Ω I_D≡5.0A,V_{GEN}=10V R_G=1Ω		6	12	ns
	t_r			10	20	
Turn-Off Time	$t_{d(off)}$			20	36	
	t_f			6	12	

Absolute Maximum Ratings (P-Channel)

(T_A=25℃ Unless otherwise noted)

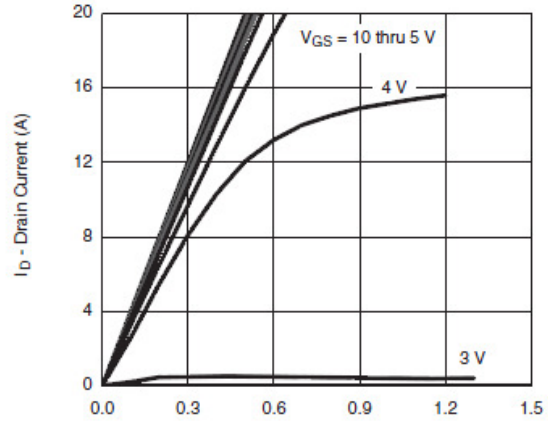
Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	-40	V
Gate –Source Voltage		V_{GSS}	±20	V
Continuous Drain Current(TJ=150℃)	T_A=25℃	I_D	-7.2	A
	T_A=70℃		-6.2	
Pulsed Drain Current		I_{DM}	-25	A
Continuous Source Current(Diode Conduction)		I_S	-1.7	A
Power Dissipation	T_A=25℃	P_D	2.8	W
	T_A=70℃		1.8	
Operating Junction Temperature		T_J	150	℃
Storage Temperature Range		T_{STG}	-55/150	℃
Thermal Resistance-Junction to Ambient		$R_{\theta JA}$	62.5	℃/W

Electrical Characteristics (P-Channel)

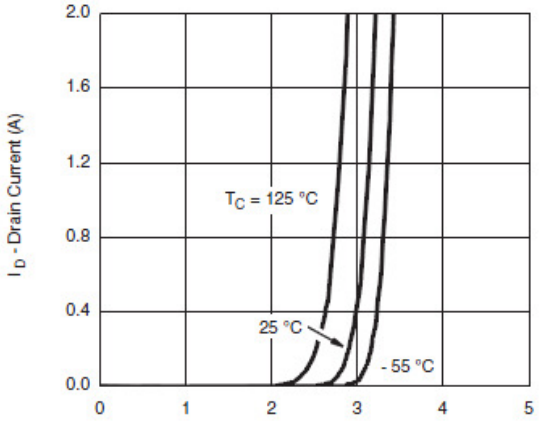
T_A=25℃ Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V,I_D= -250uA	-40			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D= -250uA	-1.0		-3.0	
Gate Leakage Current	I_{GSS}	V_{DS}=0V,V_{GS}= ±20V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}= -32V,V_{GS}=0V			-1	uA
		V_{DS}= -32V,V_{GS}=0V T_J=85℃			-20	
On-State Drain Current	$I_{D(on)}$	V_{DS}≧ -5V,V_{GS}= -10V	-20			A
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = -10V,I_D=-7.2A		34	42	mΩ
		V_{GS} = -4.5V,I_D=-6.2A		50	60	
Forward Transconductance	g_{FS}	V_{DS}= -15V,I_D= -5A		20		S
Diode Forward Voltage	V_{SD}	I_S= -2A,V_{GS}=0V		-0.8	-1.2	V
Dynamic						
Total Gate Charge	Q_g	V_{DS}=-20V,V_{GS}=-4.5V I_D= -5.0A		13	20	nC
Gate-Source Charge	Q_{gs}			4.5		
Gate-Drain Charge	Q_{gd}			6.5		
Input Capacitance	C_{iss}	V_{DS}=-20V,V_{GS}=0V f=1MHz		1100		pF
Output Capacitance	C_{oss}			145		
Reverse Transfer Capacitance	C_{rss}			115		
Turn-On Time	$t_{d(on)}$	V_{DD}=-20V,R_L=4Ω I_D≡-5.0A,V_{GEN}=-4.5V R_G=1Ω		40	80	ns
	t_r			55	100	
Turn-Off Time	$t_{d(off)}$			30	60	
	t_f			12	20	

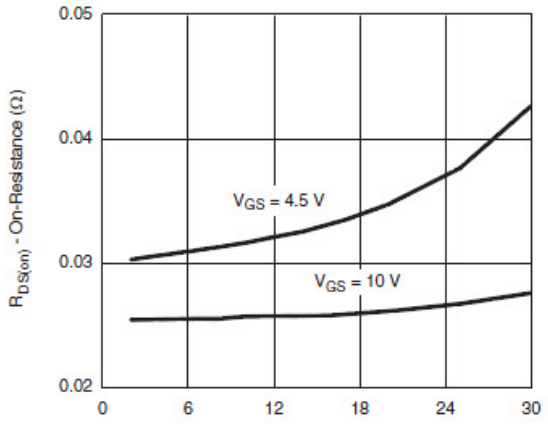
Typical Characteristics (N-Channel)



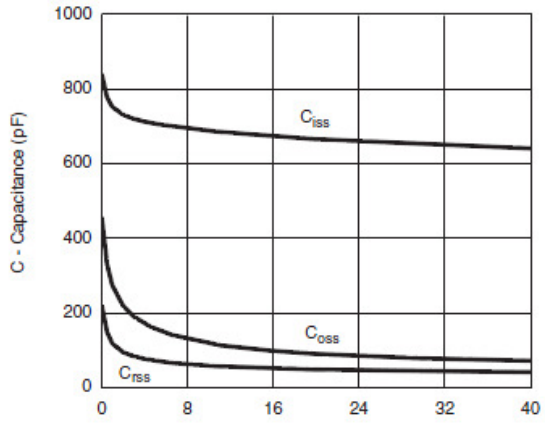
Output Characteristics



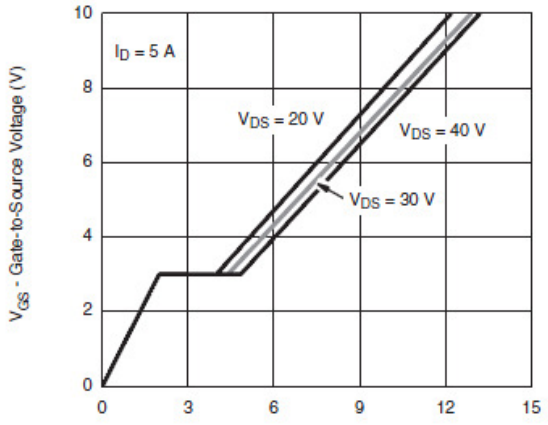
Transfer Characteristics



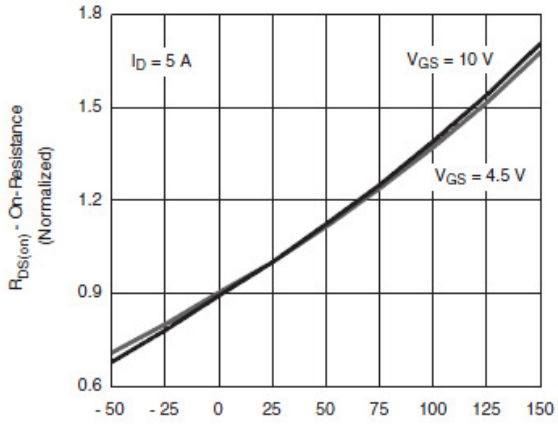
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

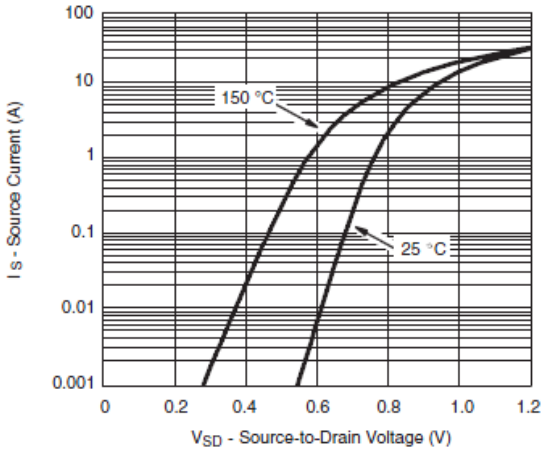


Gate Charge

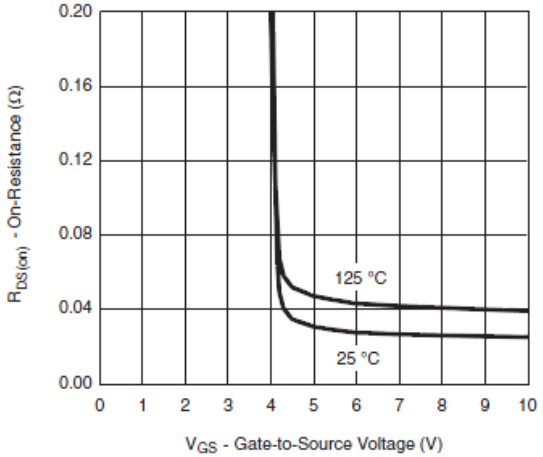


On-Resistance vs. Junction Temperature

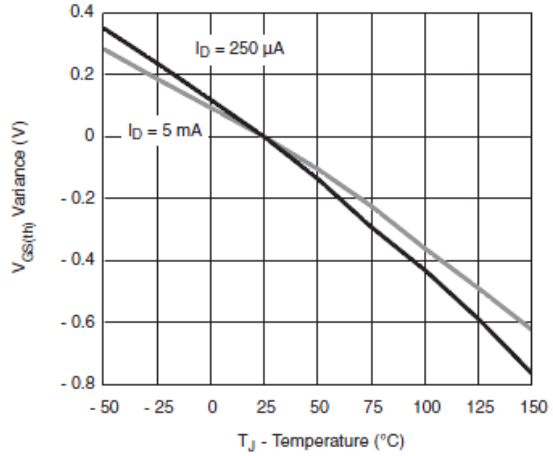
Typical Characteristics (N-Channel)



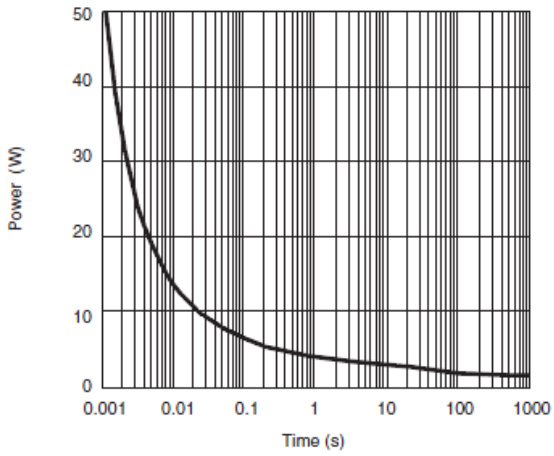
Source-Drain Diode Forward Voltage



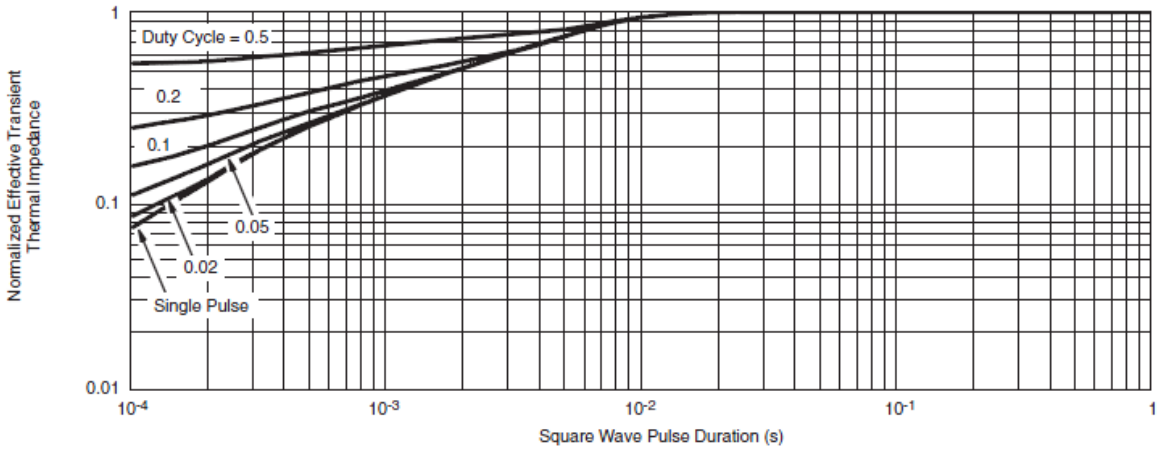
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

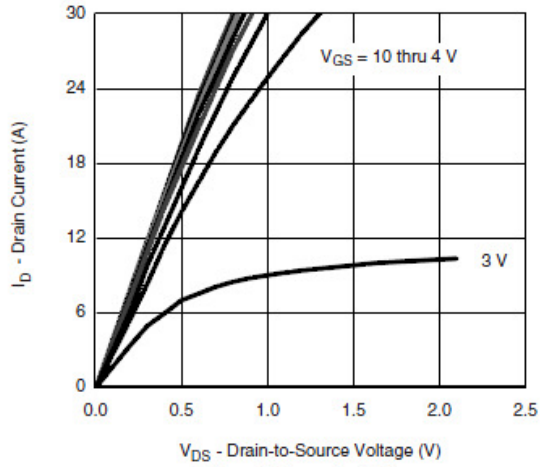


Single Pulse Power, Junction-to-Ambient

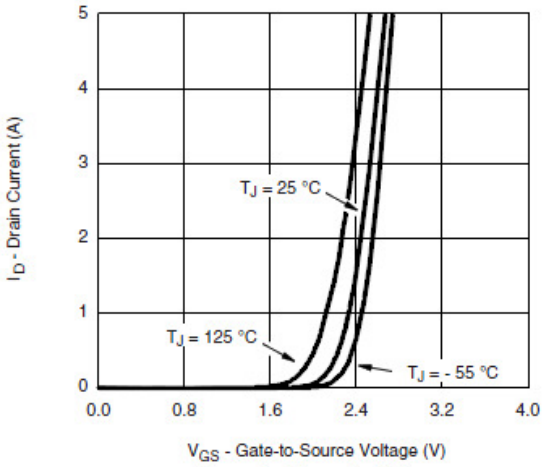


Normalized Thermal Transient Impedance, Junction-to-Case

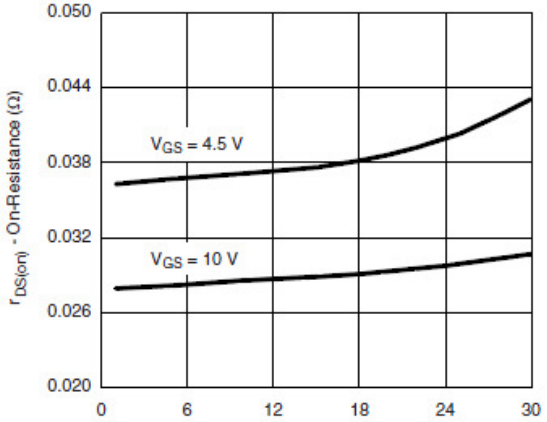
Typical Characteristics (P-Channel)



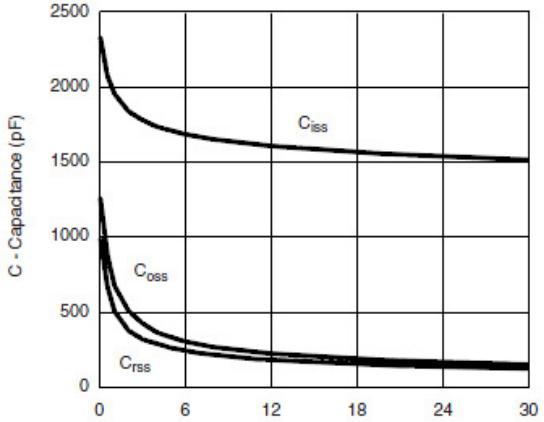
Output Characteristics



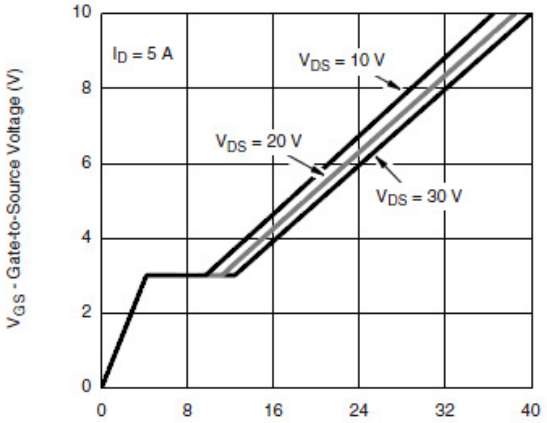
Transfer Characteristics



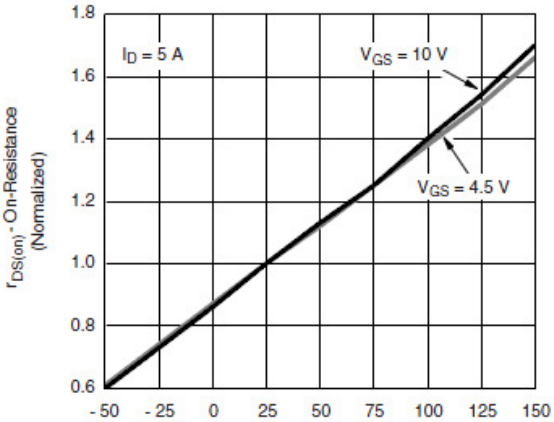
On-Resistance vs. Drain Current



Capacitance

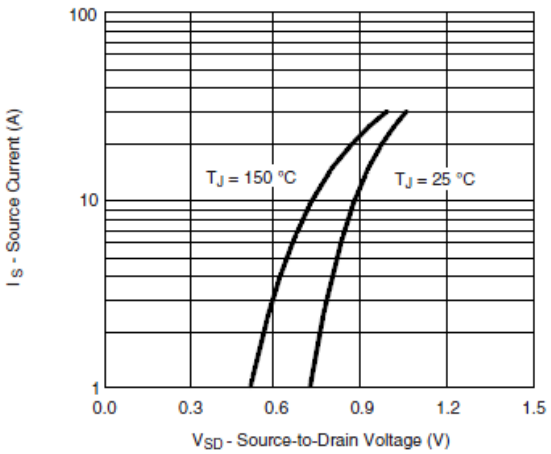


Gate Charge

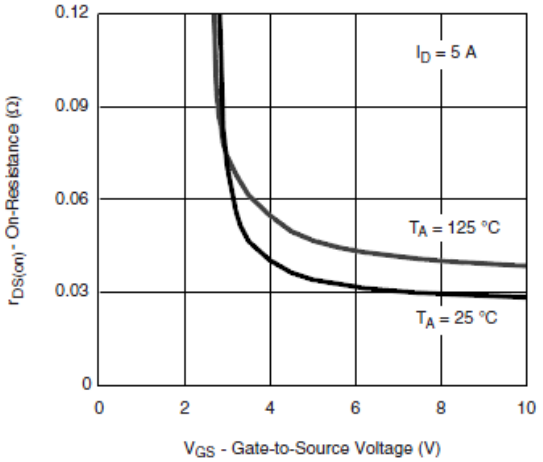


On-Resistance vs. Junction Temperature

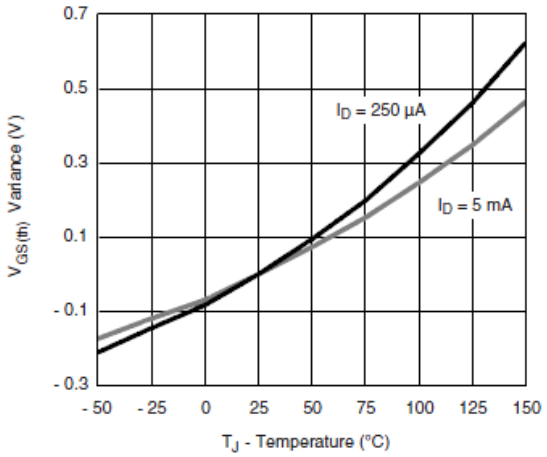
Typical Characteristics (P-Channel)



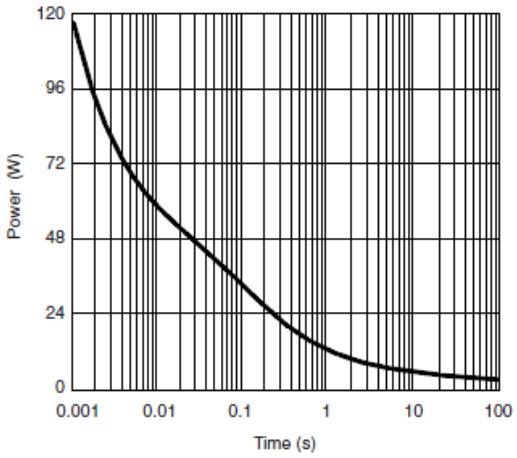
Source-Drain Diode Forward Voltage



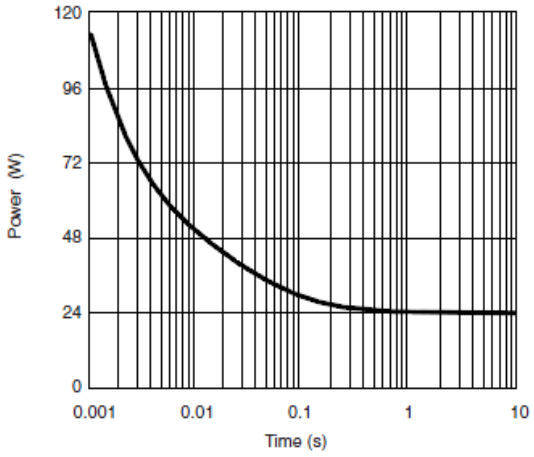
On-Resistance vs. Gate-to-Source Voltage



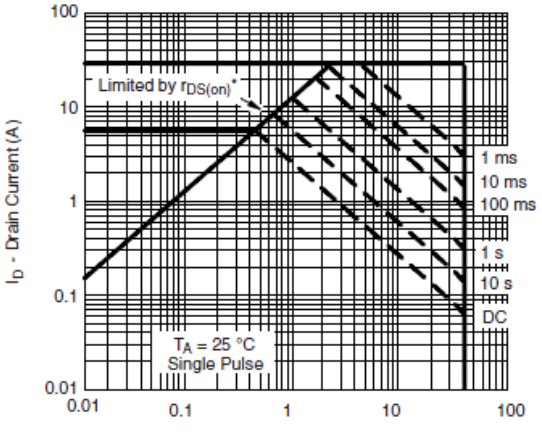
Threshold Voltage



Single Pulse Power, Junction-to-Ambient



Single Pulse Power, Junction-to-Case

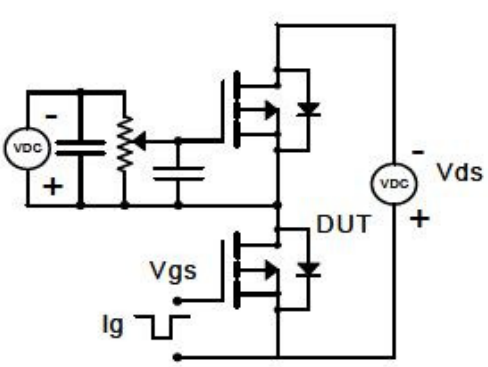


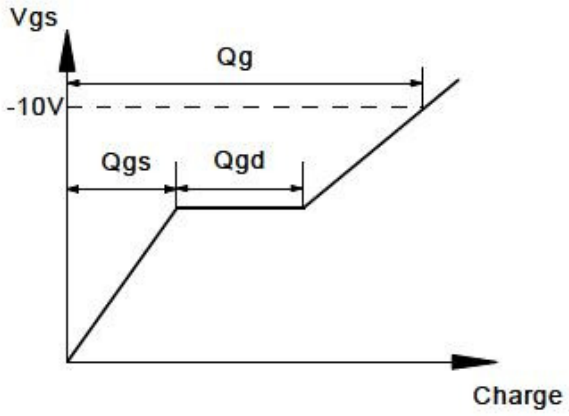
* V_{GS} > minimum V_{GS} at which $r_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

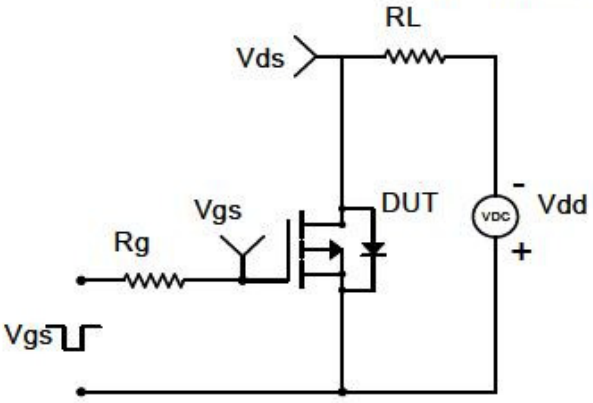
Typical Characteristics

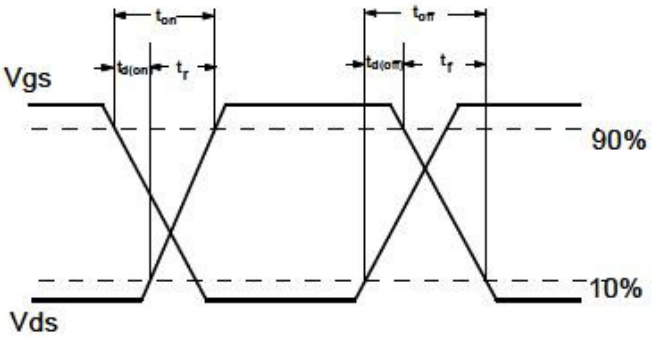
Gate Charge Test Circuit & Waveform



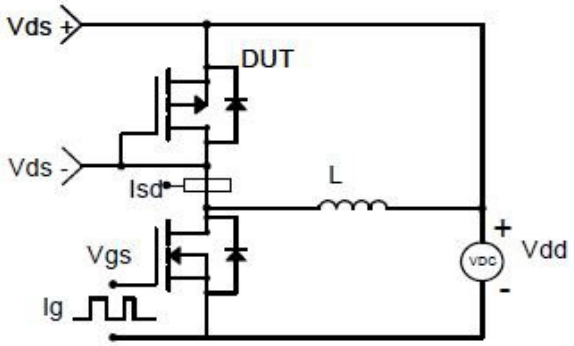


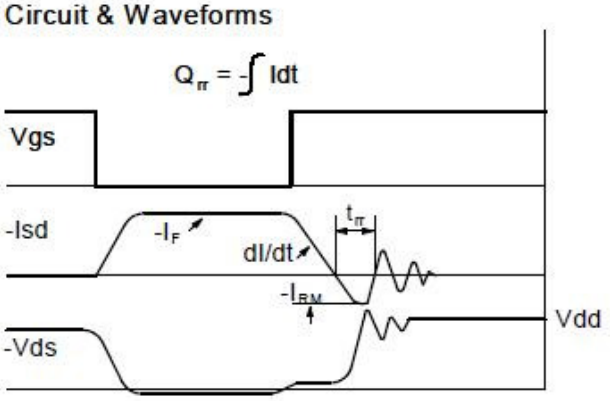
Resistive Switching Test Circuit & Waveforms



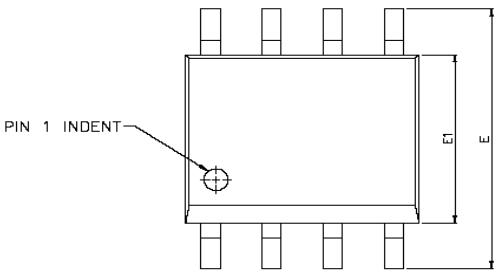


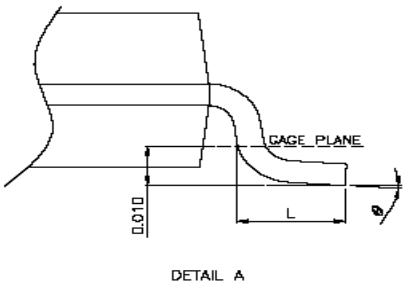
Diode Recovery Test Circuit & Waveforms

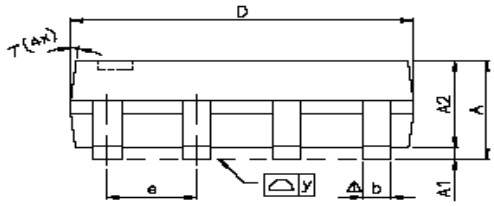


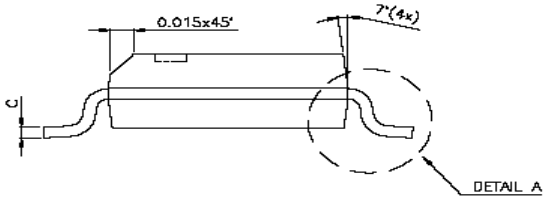


Package Information (SOP-8P)









SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.47	1.60	1.73	0.058	0.063	0.068
A1	0.10	——	0.25	0.004	——	0.010
A2	——	1.45	——	——	0.057	——
b	0.33	0.41	0.51	0.013	0.016	0.020
C	0.19	0.20	0.25	0.0075	0.008	0.0098
D	4.80	4.85	4.95	0.189	0.191	0.195
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.154	0.157
e	——	1.27	——	——	0.050	——
L	0.38	0.71	1.27	0.015	0.028	0.050
② y	——	——	0.076	——	——	0.003
θ	0°	——	8°	0°	——	8°

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