



### General Description

AFC4590WS, N & P Pair enhancement mode MOSFET, uses Advanced Trench Technology to provide excellent  $R_{DS(ON)}$ , 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

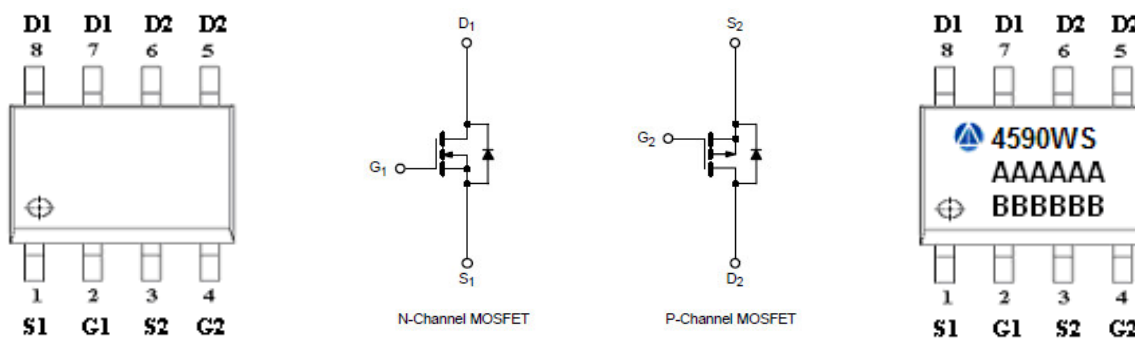
N-Channel

- 100V/6.2A,  $R_{DS(ON)} = 45m\Omega @ V_{GS} = 10V$
- 100V/4.2A,  $R_{DS(ON)} = 50m\Omega @ V_{GS} = 4.5V$

P-Channel

- -100V/-5.2A,  $R_{DS(ON)} = 90m\Omega @ V_{GS} = -10V$
- -100V/-3.4A,  $R_{DS(ON)} = 100m\Omega @ V_{GS} = -4.5V$

### Pin Description ( SOP-8P )



### Application

- H bridge / DC-AC inverter  
- Brushless DC motors

### 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
AFC4590WSS8RG	4590WS	SOP-8P	Tape & Reel	2500 EA

- ※ A Lot code
- ※ B Date code
- ※ AFC4590WSS8RG : 13" Tape & Reel ; Pb- Free ; Halogen- Free



**Absolute Maximum Ratings ( N-Channel )**

(T<sub>A</sub>=25°C Unless otherwise noted)

Parameter	Symbol	Typical	Unit
Drain-Source Voltage	V <sub>DSS</sub>	100	V
Gate –Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current(T <sub>J</sub> =150°C)	I <sub>D</sub>	T <sub>A</sub> =25°C	6.2
		T <sub>A</sub> =70°C	4.2
Pulsed Drain Current	I <sub>DM</sub>	20	A
Continuous Source Current(Diode Conduction)	I <sub>S</sub>	3	A
Power Dissipation	P <sub>D</sub>	T <sub>A</sub> =25°C	2.8
		T <sub>A</sub> =70°C	1.8
Operating Junction Temperature	T <sub>J</sub>	150	°C
Storage Temperature Range	T <sub>STG</sub>	-55/150	°C
Thermal Resistance-Junction to Ambient	R <sub>θJA</sub>	62.5	°C/W

**Electrical Characteristics ( N-Channel )**

(T<sub>A</sub>=25°C Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	100			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	1.0		2.0	V
Gate Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V			±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =80V, V <sub>GS</sub> =0V			1	uA
		V <sub>DS</sub> =80V, V <sub>GS</sub> =0V T <sub>J</sub> =85°C			5	
On-State Drain Current	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ 5V, V <sub>GS</sub> =4.5V	20			A
Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =6.2A		38	45	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =4.2A		42	50	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =15V, I <sub>D</sub> =6A		14		S
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =2A, V <sub>GS</sub> =0V		0.8	1.3	V
<b>Dynamic</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V I <sub>D</sub> ≅5.9A		16	24	nC
Gate-Source Charge	Q <sub>gs</sub>			4.0		
Gate-Drain Charge	Q <sub>gd</sub>			6.0		
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V f=1MHz		850		pF
Output Capacitance	C <sub>oss</sub>			90		
Reverse Transfer Capacitance	C <sub>rss</sub>			40		
Turn-On Time	t <sub>d(on)</sub>	V <sub>DD</sub> =50V, R <sub>L</sub> =50Ω I <sub>D</sub> ≅5.9A, V <sub>GEN</sub> =10V R <sub>G</sub> =6Ω		15	25	ns
	t <sub>r</sub>			15	25	
Turn-Off Time	t <sub>d(off)</sub>			35	55	
	t <sub>f</sub>			20	35	



**Absolute Maximum Ratings ( P-Channel )**

(T<sub>A</sub>=25°C Unless otherwise noted)

Parameter	Symbol	Typical	Unit
Drain-Source Voltage	V <sub>DSS</sub>	-100	V
Gate –Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current(T <sub>J</sub> =150°C)	I <sub>D</sub>	T <sub>A</sub> =25°C	-5.2
		T <sub>A</sub> =70°C	-3.4
Pulsed Drain Current	I <sub>DM</sub>	-20	A
Continuous Source Current(Diode Conduction)	I <sub>S</sub>	-3	A
Power Dissipation	P <sub>D</sub>	T <sub>A</sub> =25°C	2.8
		T <sub>A</sub> =70°C	1.8
Operating Junction Temperature	T <sub>J</sub>	150	°C
Storage Temperature Range	T <sub>STG</sub>	-55/150	°C
Thermal Resistance-Junction to Ambient	R <sub>θJA</sub>	62.5	°C/W

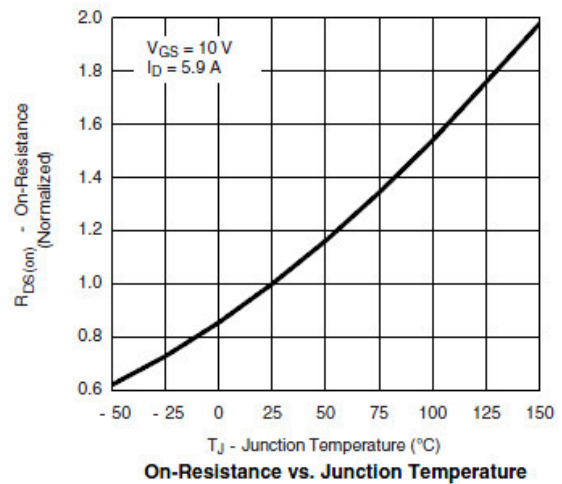
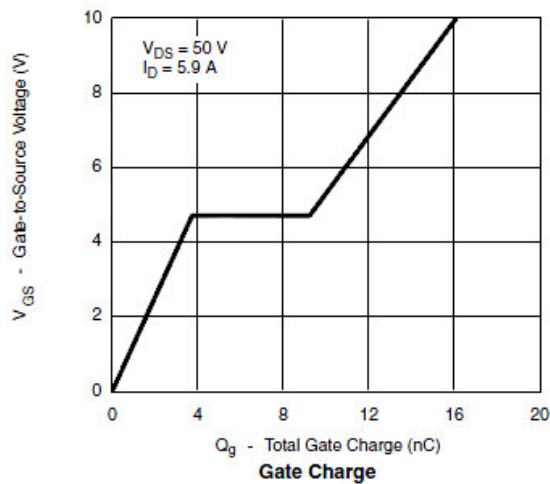
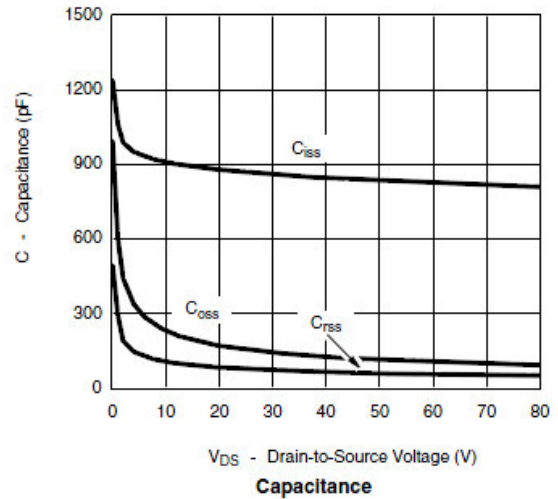
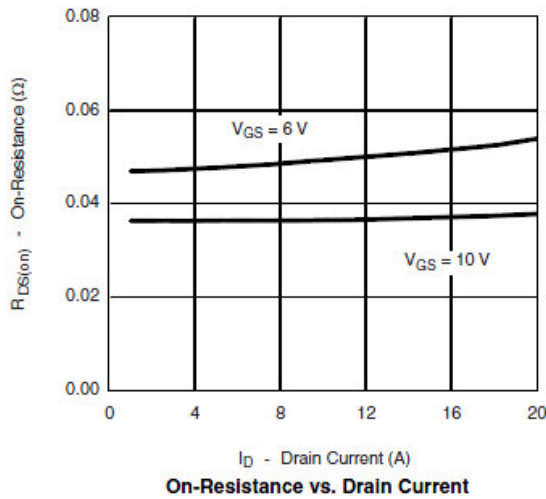
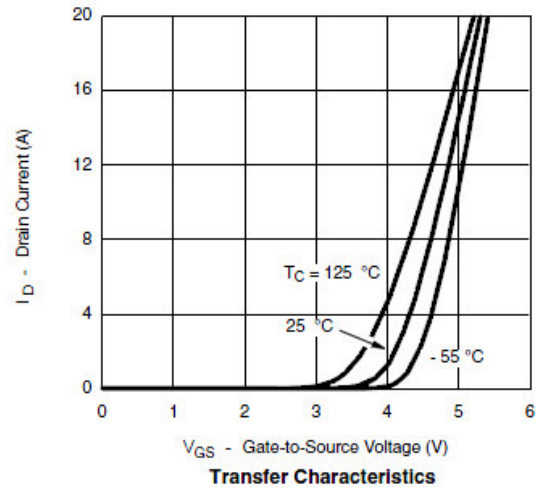
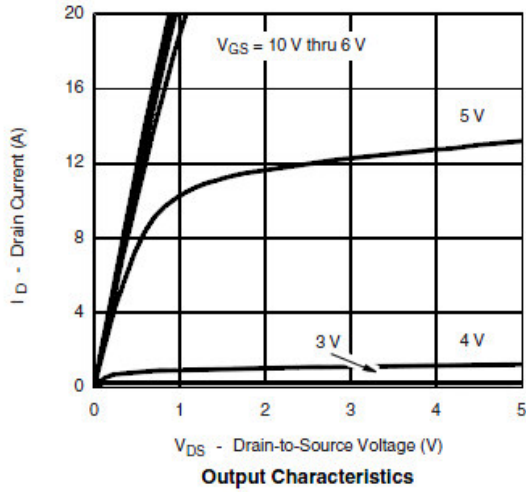
**Electrical Characteristics ( P-Channel )**

(T<sub>A</sub>=25°C Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> = -250uA	-100			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> = -250uA	-1.0		-2.5	
Gate Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V			±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -80V, V <sub>GS</sub> =0V			-1	
		V <sub>DS</sub> = -80V, V <sub>GS</sub> =0V T <sub>J</sub> =85°C			-30	uA
On-State Drain Current	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ -10V, V <sub>GS</sub> = -10V	-20			A
Drain-Source On-Resistance	R <sub>Ds(on)</sub>	V <sub>GS</sub> = -10V, I <sub>D</sub> =-5.2A		80	90	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> =-3.5A		87	100	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = -15V, I <sub>D</sub> = -5A		19		S
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = -2A, V <sub>GS</sub> =0V		-0.8	-1.3	V
<b>Dynamic</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-75V, V <sub>GS</sub> =-10V I <sub>D</sub> = -5.2A		85	150	nC
Gate-Source Charge	Q <sub>gs</sub>			18		
Gate-Drain Charge	Q <sub>gd</sub>			28		
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-60V, V <sub>GS</sub> =0V f=1MHz		4300		pF
Output Capacitance	C <sub>oss</sub>			280		
Reverse Transfer Capacitance	C <sub>rss</sub>			220		
Turn-On Time	t <sub>d(on)</sub>	V <sub>DD</sub> =-75V, R <sub>L</sub> =16Ω I <sub>D</sub> ≡-5.2A, V <sub>GEN</sub> =-10V R <sub>G</sub> =6Ω		25	50	ns
	t <sub>r</sub>			45	85	
Turn-Off Time	t <sub>d(off)</sub>			115	200	
	t <sub>f</sub>			65	130	

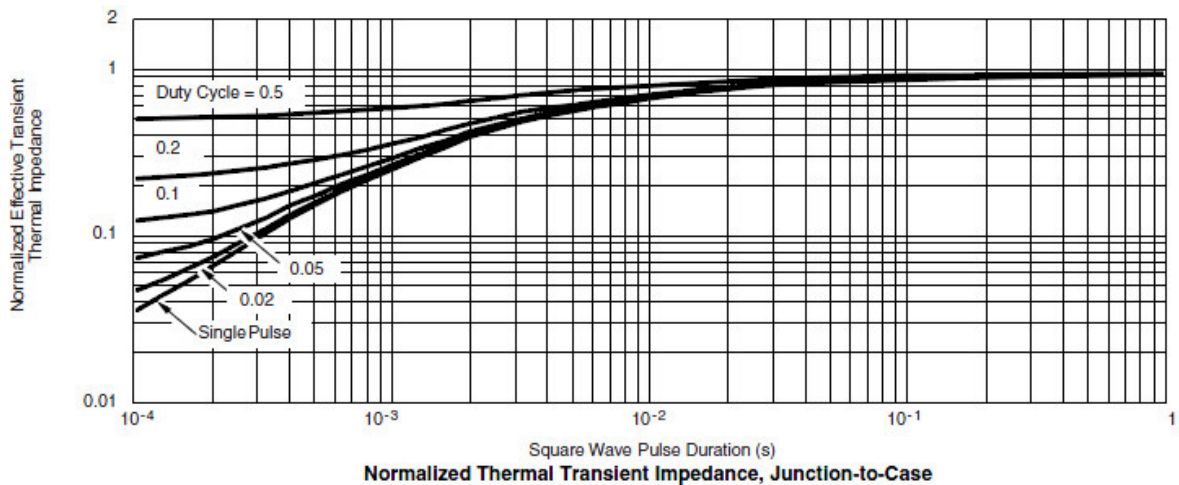
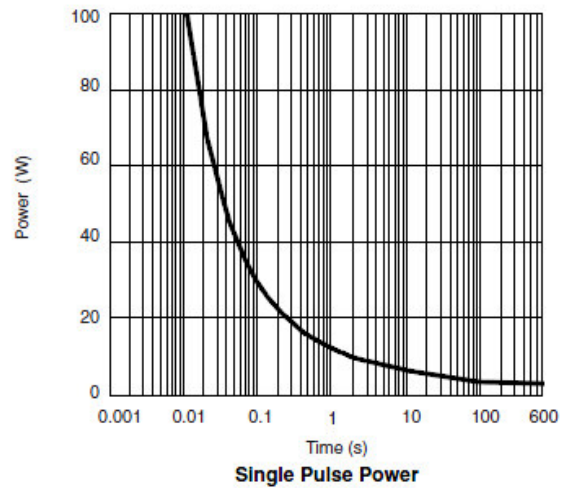
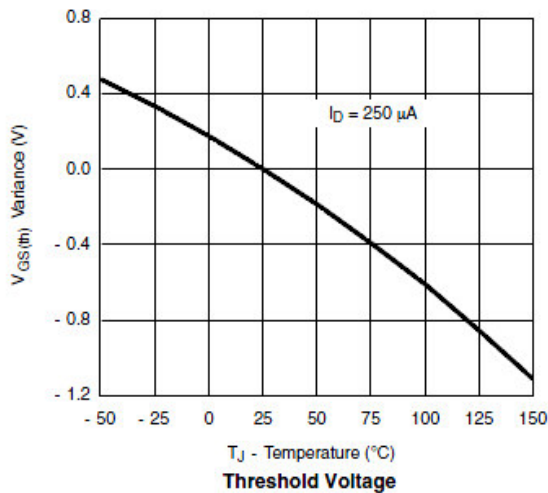
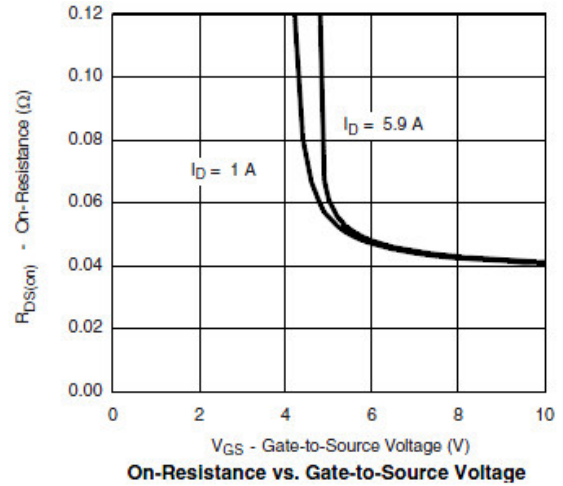
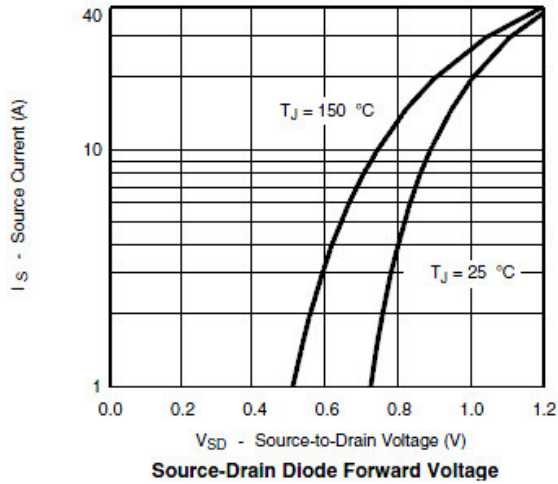


## Typical Characteristics ( N-Channel )



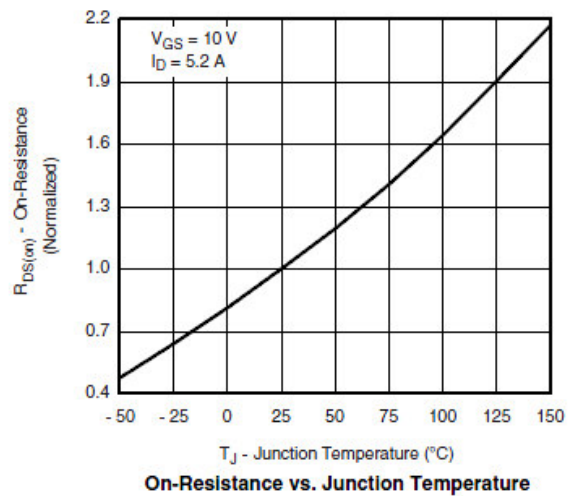
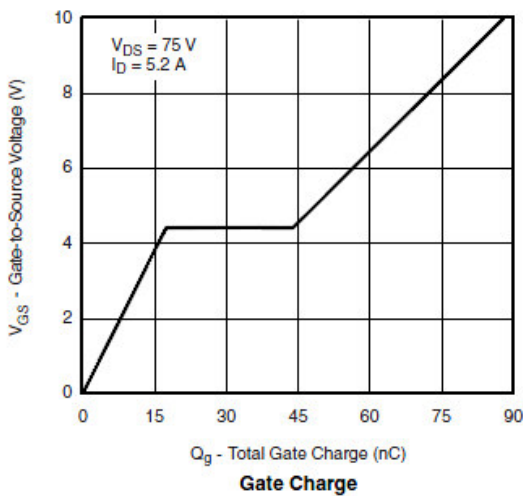
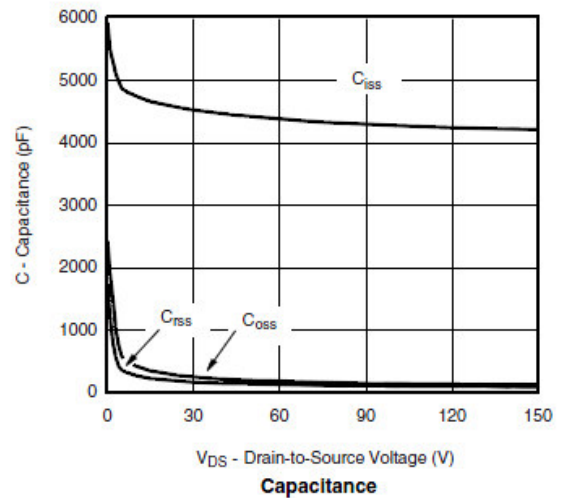
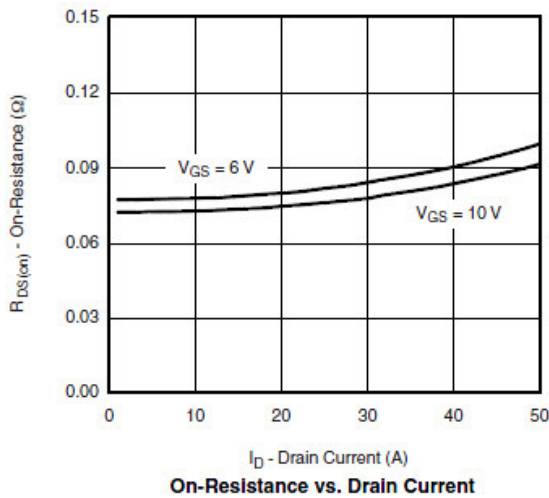
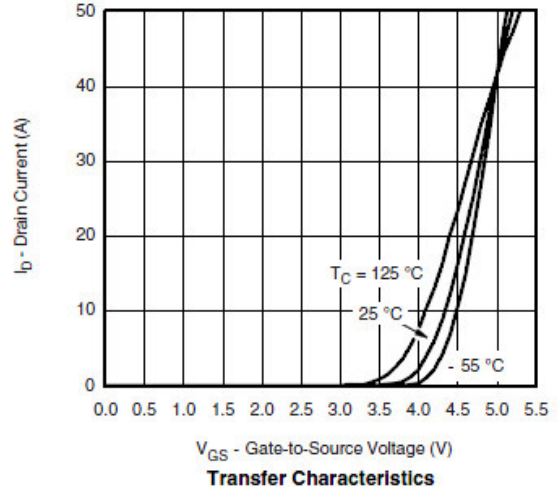
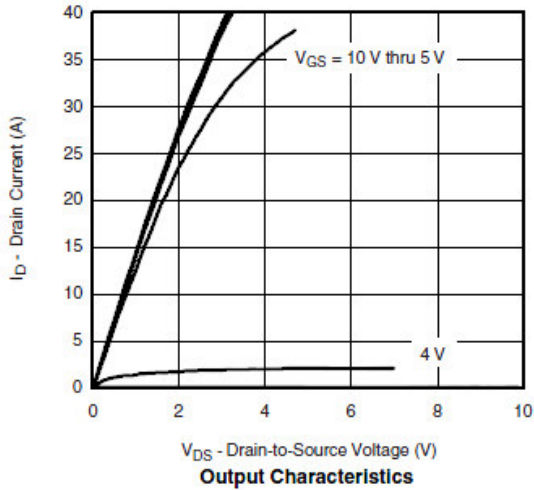


## Typical Characteristics ( N-Channel )





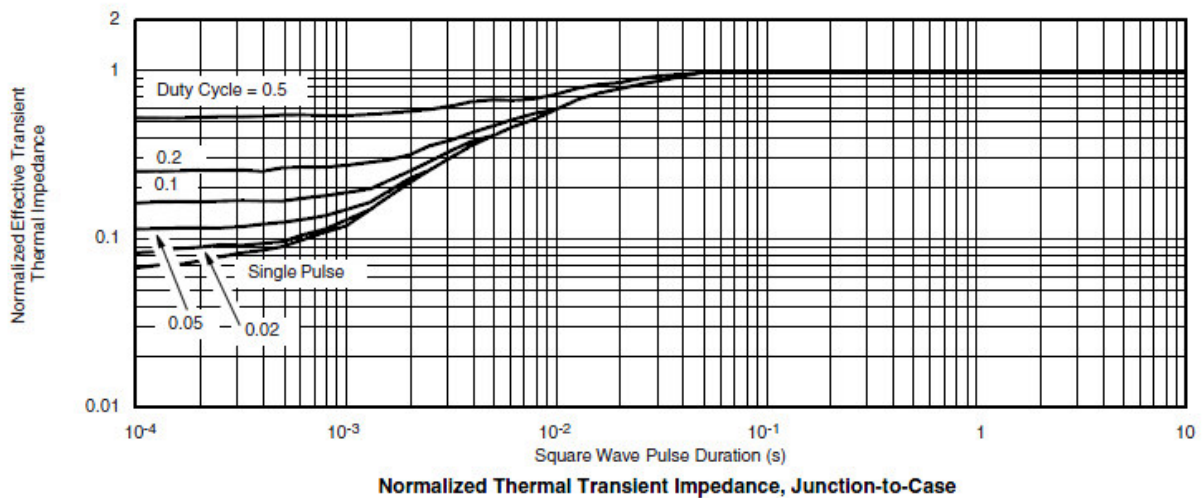
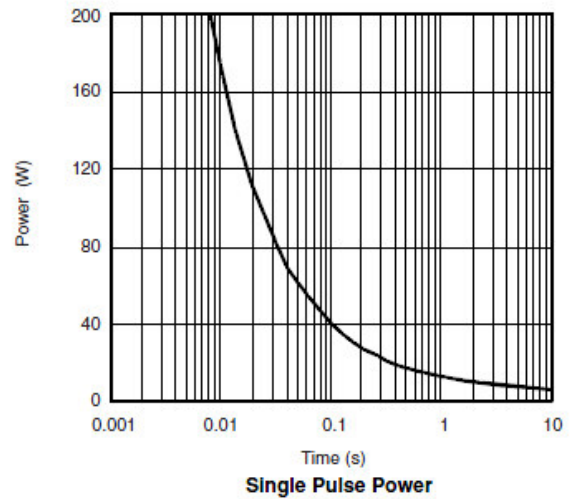
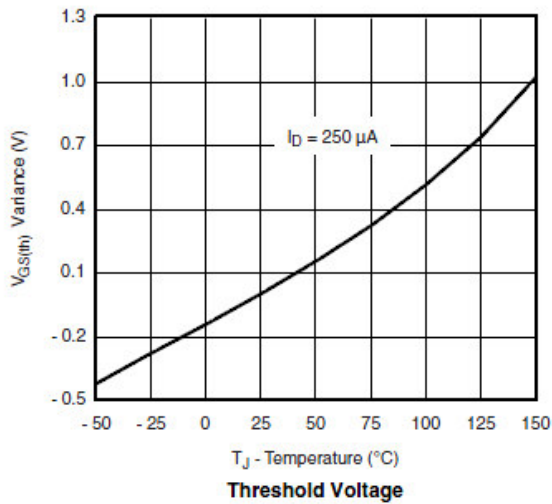
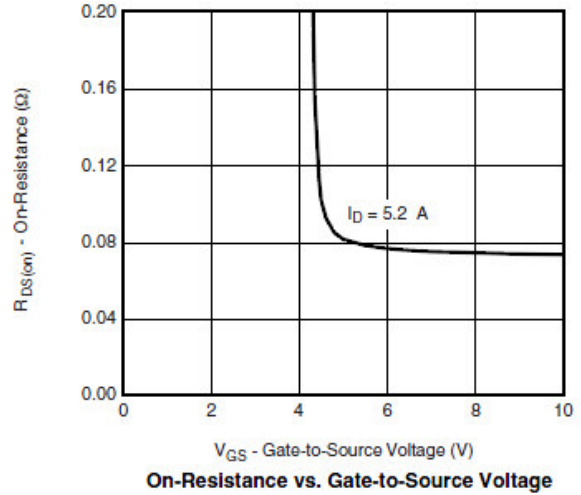
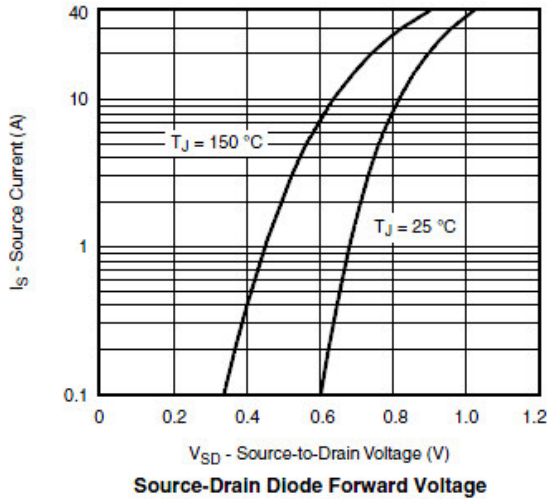
## Typical Characteristics ( P-Channel )







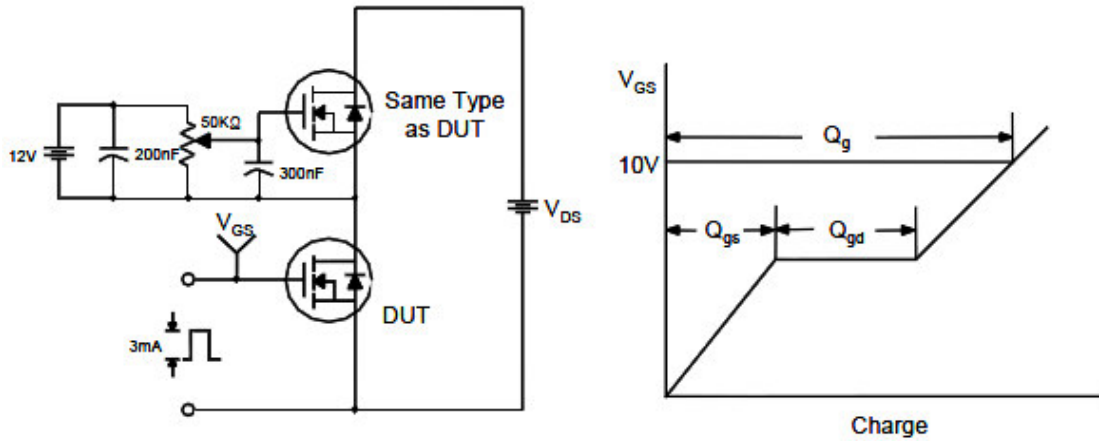
## Typical Characteristics ( P-Channel )



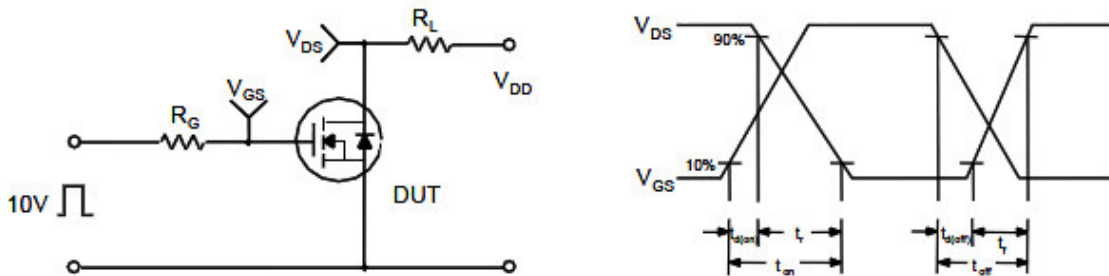


**Typical Characteristics**

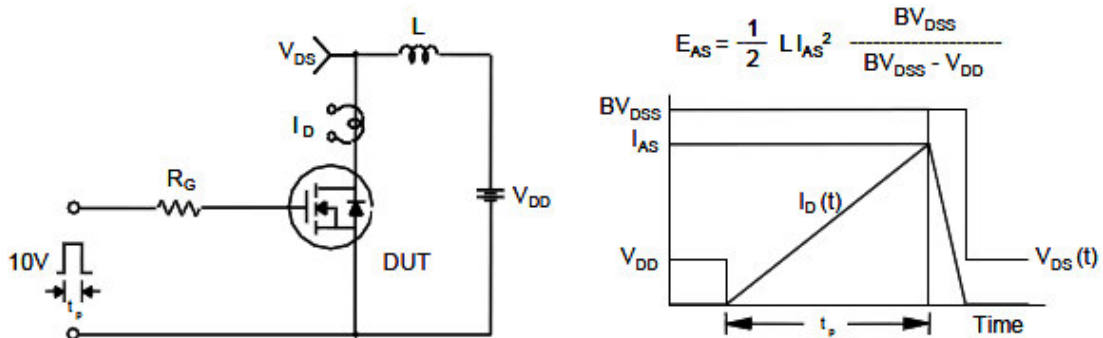
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



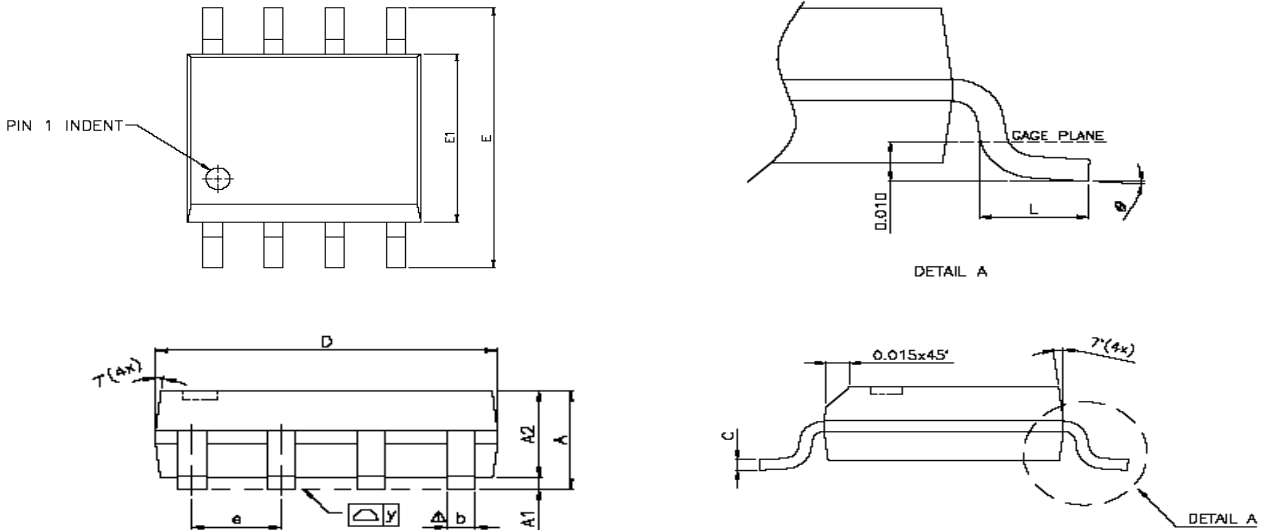
Unclamped Inductive Switching Test Circuit & Waveforms







**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
$\Delta$ y	—	—	0.076	—	—	0.003
$\varnothing$	0°	—	8°	0°	—	8°

©2010 Alfa-MOS Technology Corp.  
 2F, No.80, Sec.1, Cheng Kung Rd., Nan Kang Dist., Taipei City 115, Taiwan (R.O.C.)  
 Tel : 886 2) 2651 3928  
 Fax : 886 2) 2786 8483  
 ©http://www.alfa-mos.com