



### General Description

AFC1036E, 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, such as smart phone and notebook computer and other battery powered circuits, and low in-line power loss are needed in commercial industrial surface mount applications.

### Features

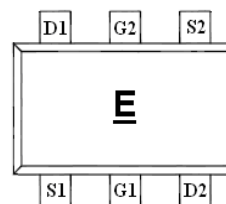
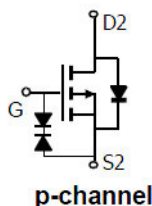
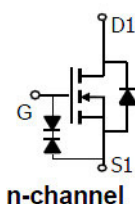
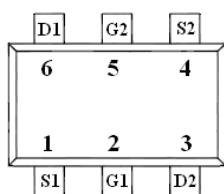
#### N-Channel

- 30V/0.6A,  $R_{DS(ON)}=500m\Omega@V_{GS}=4.5V$
- 30V/0.5A,  $R_{DS(ON)}=700m\Omega@V_{GS}=2.5V$

#### P-Channel

- -30V/-0.4A,  $R_{DS(ON)}=900m\Omega@V_{GS}=-4.5V$
- -30V/-0.3A,  $R_{DS(ON)}=1400m\Omega@V_{GS}=-2.5V$
- Low Offset (Error) Voltage
- Low-Voltage Operation
- High-Speed Circuits
- Low Battery Voltage Operation
- ESD Protected
- SOT-563 package design

### Pin Description ( SOT-563 )



### Application

- Load Switch for Portable Devices, Smart Phones, Pagers

### Pin Define

Pin	Symbol	Description
1	S1	Source 1
2	G1	Gate 1
3	D2	Drain 2
4	S2	Source 2
5	G2	Gate 2
6	D1	Drain1

### Ordering Information

Part Ordering No.	Part Marking	Package	Unit	Quantity
AFC1036ES56RG	<u>E</u>	SOT-563	Tape & Reel	3000 EA

※ E parts code

※ AFC1036ES56RG : 7" Tape & Reel ; Pb- Free ; Halogen -Free



**Absolute Maximum Ratings**

( $T_A=25^{\circ}\text{C}$  Unless otherwise noted)

Parameter	Symbol	Value		Unit	
		N-Channel	P-Channel		
Drain-Source Voltage	$V_{DSS}$	30	-30	V	
Gate –Source Voltage	$V_{GSS}$	$\pm 12$	$\pm 12$	V	
Continuous Drain Current( $T_J=150^{\circ}\text{C}$ )	$I_D$	$T_A=25^{\circ}\text{C}$	0.6	-0.4	A
		$T_A=70^{\circ}\text{C}$	0.4	-0.2	
Pulsed Drain Current	$I_{DM}$	2	-1	A	
Continuous Source Current(Diode Conduction)	$I_S$	0.2	-0.2	A	
Power Dissipation	$P_D$	$T_A=25^{\circ}\text{C}$	0.3		W
		$T_A=70^{\circ}\text{C}$	0.2		
Operating Junction Temperature	$T_J$	-55/150		$^{\circ}\text{C}$	
Storage Temperature Range	$T_{STG}$	-55/150		$^{\circ}\text{C}$	

**Electrical Characteristics ( N-Channel )**

( $T_A=25^{\circ}\text{C}$  Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	30			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5		1.5	
Gate Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 12V$			$\pm 5$	mA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=24V, V_{GS}=0V$			1	uA
		$V_{DS}=24V, V_{GS}=0V$ $T_J=85^{\circ}\text{C}$			5	
On-State Drain Current	$I_{D(on)}$	$V_{DS} \geq 5V, V_{GS}=4.5V$	0.6			A
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=0.6A$		350	500	m $\Omega$
		$V_{GS}=2.5V, I_D=0.5A$		600	700	
Forward Transconductance	$g_{FS}$	$V_{DS}=15V, I_D=0.6A$		1		S
Diode Forward Voltage	$V_{SD}$	$I_S=0.15A, V_{GS}=0V$		0.65	1.2	V
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V$ $f=1\text{MHz}$		28		pF
Output Capacitance	$C_{oss}$			10		
Reverse Transfer Capacitance	$C_{rss}$			6		
Total Gate Charge	$Q_g$	$V_{DS}=15V, V_{GS}=4.5V$ $I_D \equiv 0.6A$		0.6	1.2	nC
Gate-Source Charge	$Q_{gs}$			0.2		
Gate-Drain Charge	$Q_{gd}$			0.2		
Turn-On Time	$t_{d(on)}$	$V_{DD}=15V, R_L=30\Omega$ $I_D \equiv 0.5A, V_{GEN}=4.5V$ $R_G=1\Omega$		25	40	ns
	$t_r$			25	40	
Turn-Off Time	$t_{d(off)}$			15	25	
	$t_f$			15	25	



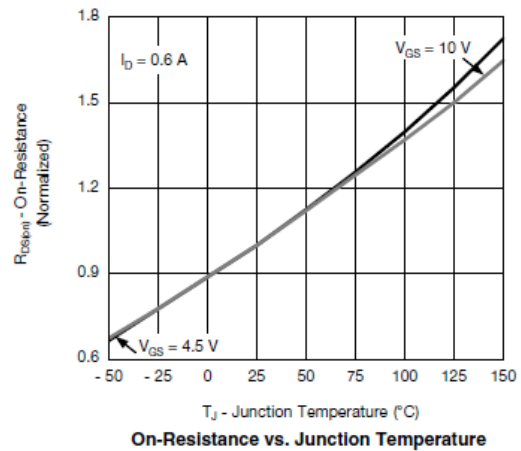
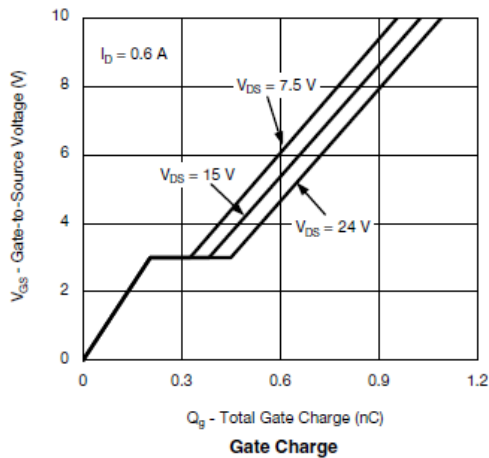
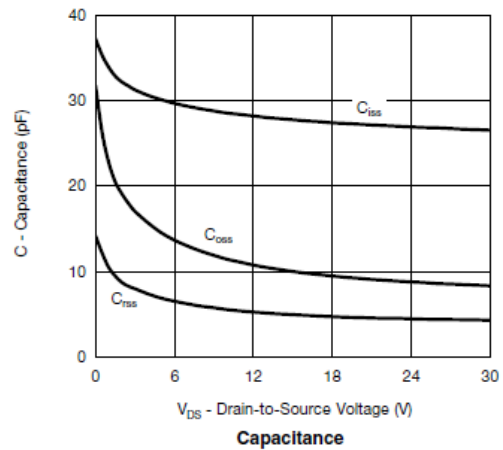
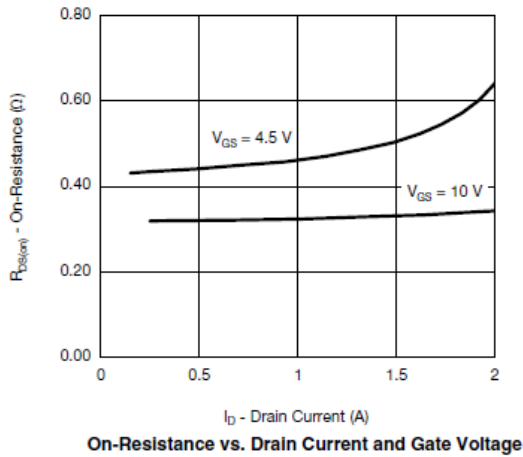
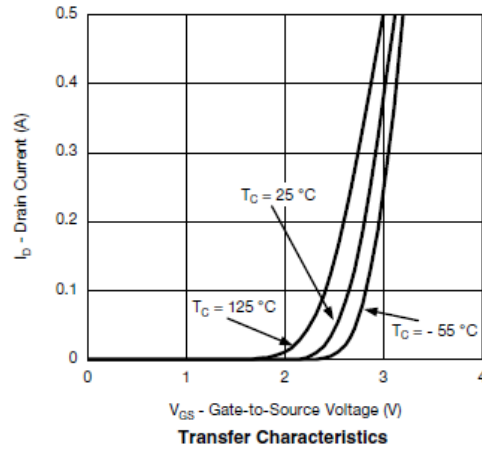
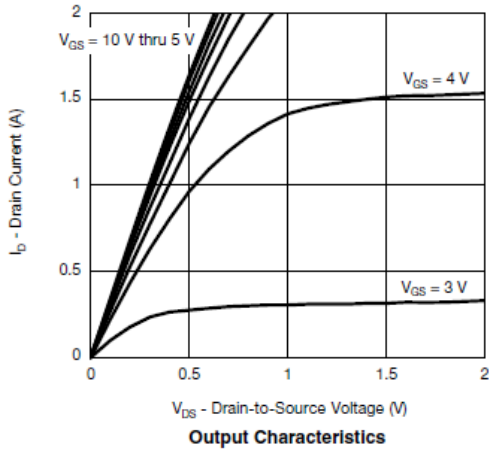
**Electrical Characteristics ( P-Channel )**

(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	-30			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA	-0.7		-1.5	
Gate Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±12V			±5	mA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V			-1	uA
		V <sub>DS</sub> =-24V, 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	0.5			A
Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =0.4A		450	900	mΩ
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =0.3A		1000	1400	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =-15V, I <sub>D</sub> =-0.5A		1		S
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =-0.3A, V <sub>GS</sub> =0V		0.65	1.2	V
<b>Dynamic</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V f=1MHz		34		pF
Output Capacitance	C <sub>oss</sub>			12		
Reverse Transfer Capacitance	C <sub>rss</sub>			8		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-15V, V <sub>GS</sub> =-4.5V I <sub>D</sub> ≡-0.4A		0.8	1.3	nC
Gate-Source Charge	Q <sub>gs</sub>			0.4		
Gate-Drain Charge	Q <sub>gd</sub>			0.4		
Turn-On Time	t <sub>d(on)</sub>	V <sub>DD</sub> =-15V, R <sub>L</sub> =38Ω I <sub>D</sub> ≡-0.2A, V <sub>GEN</sub> =-4.5V R <sub>G</sub> =1Ω		35	50	ns
	t <sub>r</sub>			20	30	
Turn-Off Time	t <sub>d(off)</sub>			10	20	
	t <sub>f</sub>			10	20	

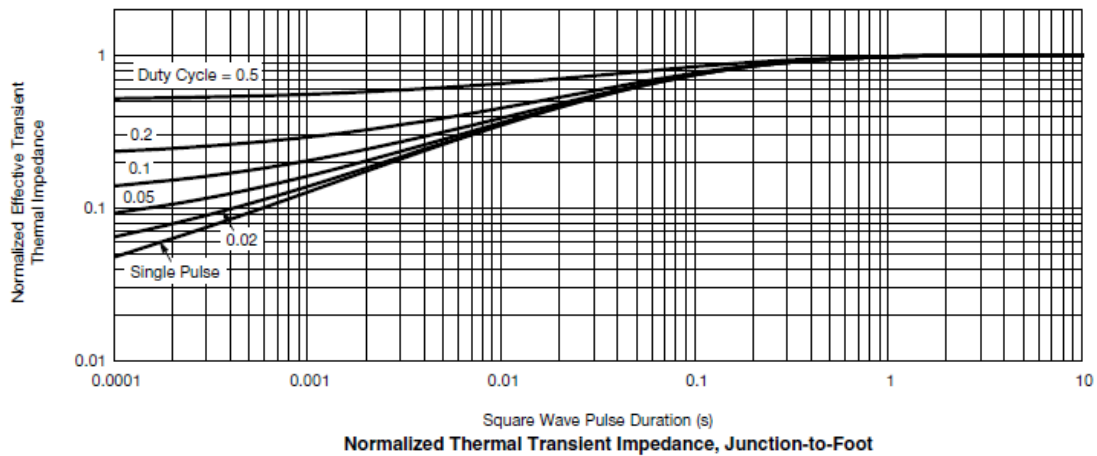
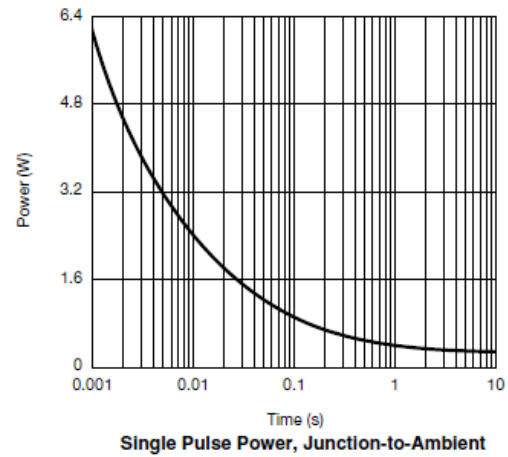
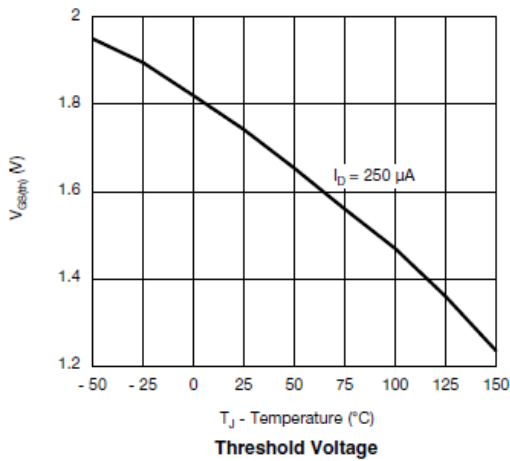
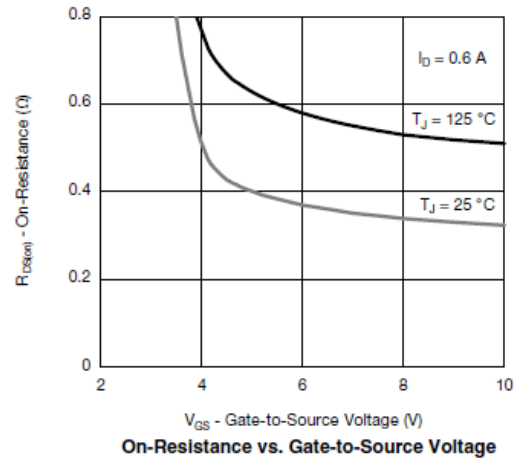
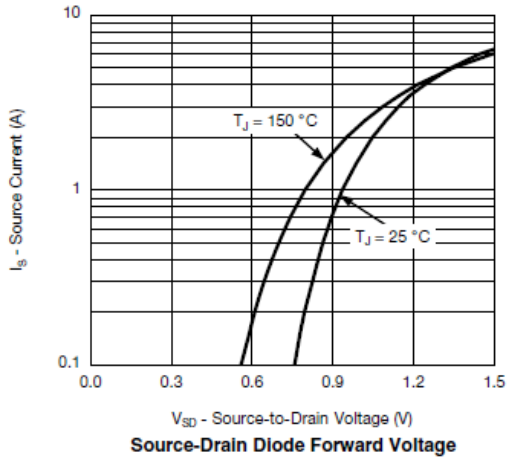


### Typical Characteristics ( N-Channel )





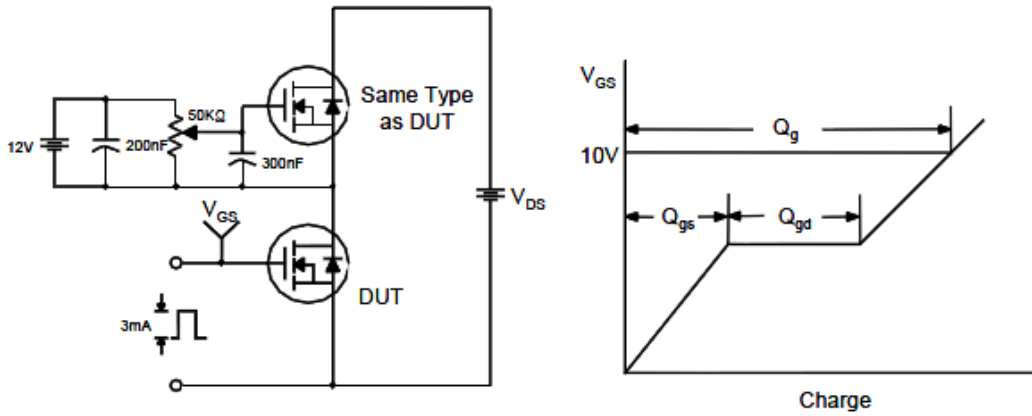
### Typical Characteristics ( N-Channel )



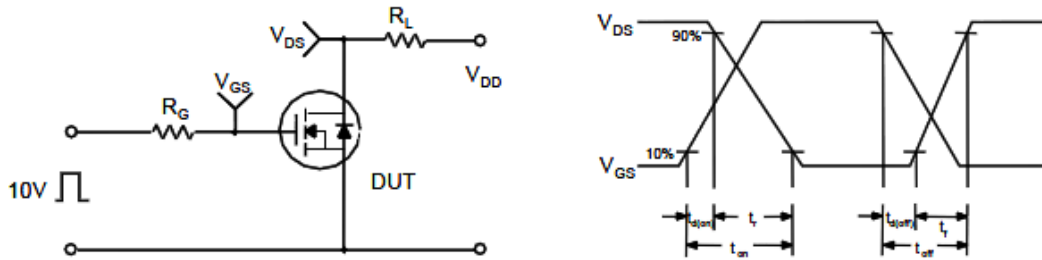


Typical Characteristics ( N-Channel )

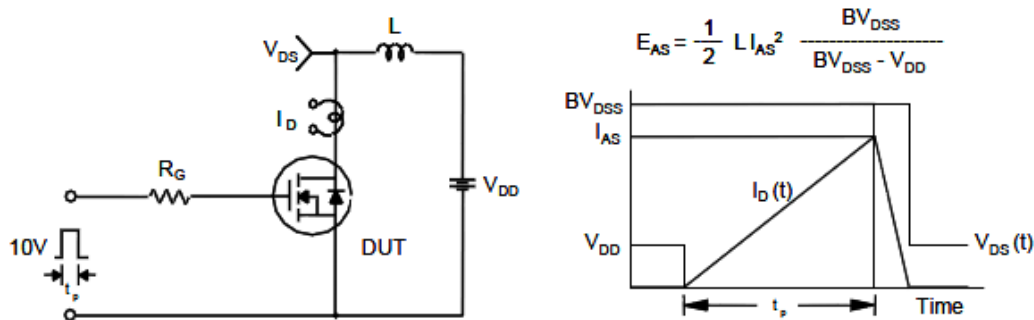
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

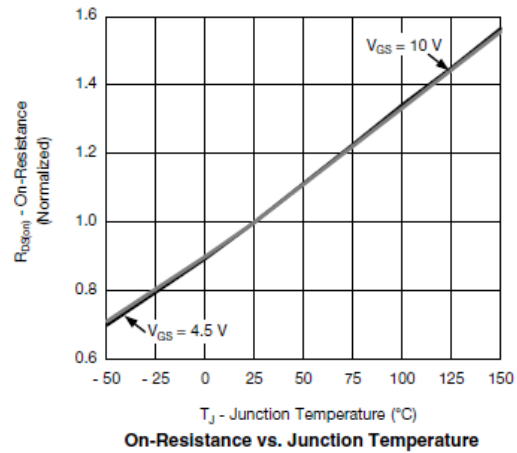
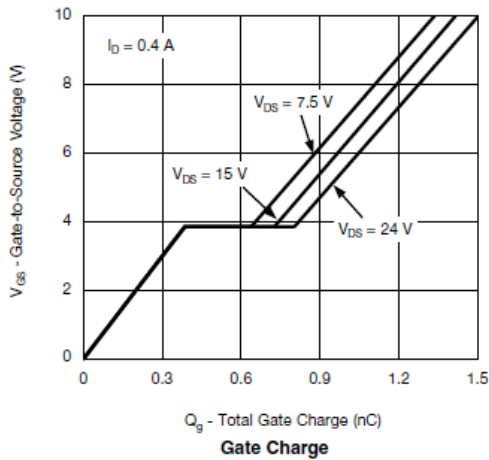
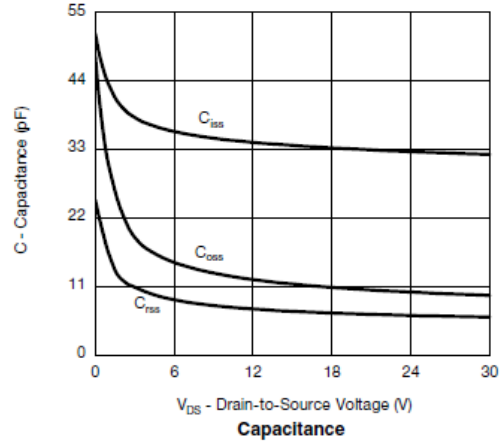
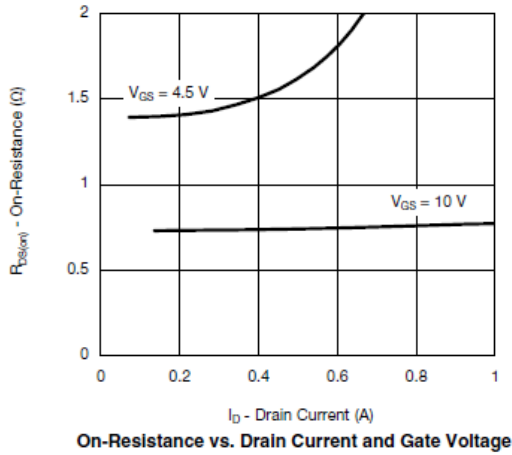
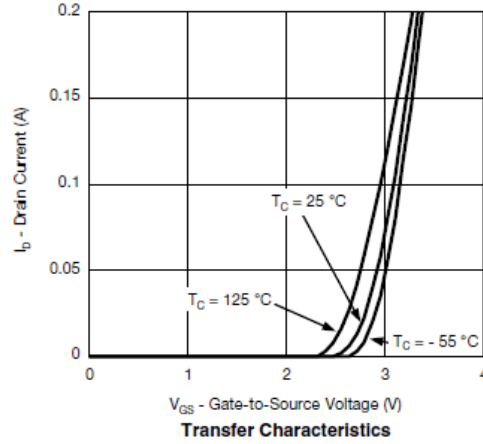
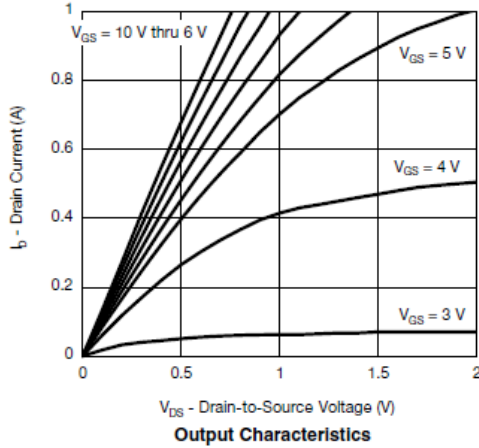


Unclamped Inductive Switching Test Circuit & Waveforms



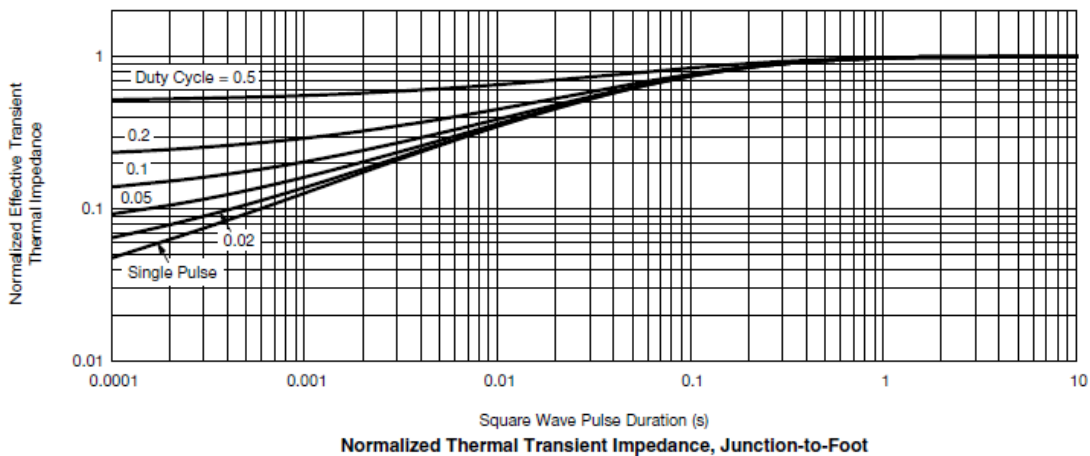
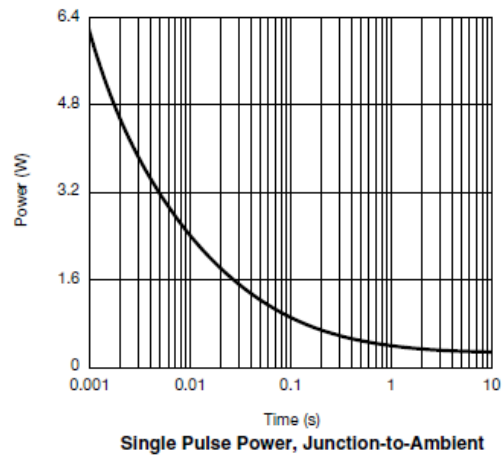
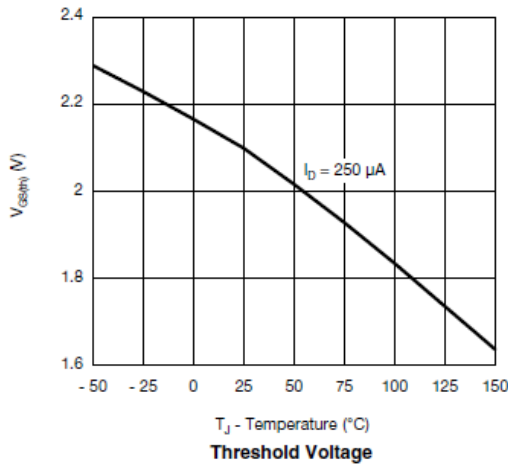
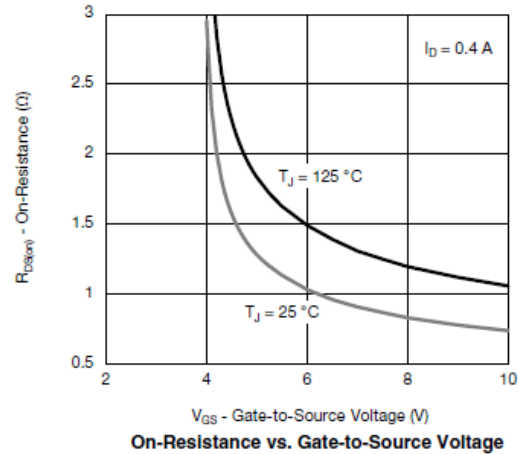
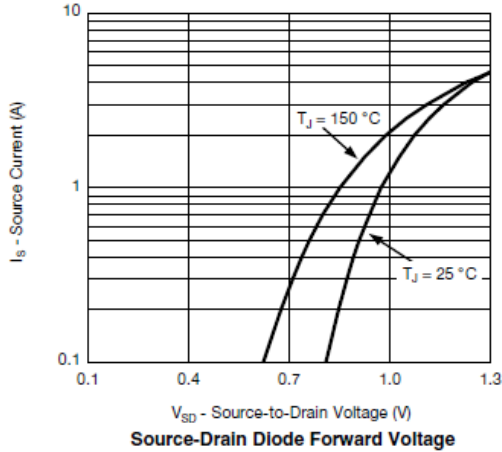


## Typical Characteristics ( P-Channel )





### Typical Characteristics ( P-Channel )

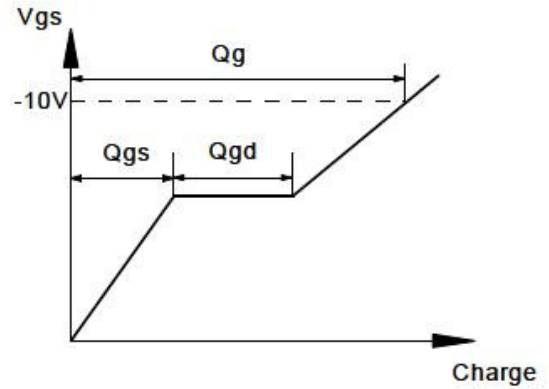
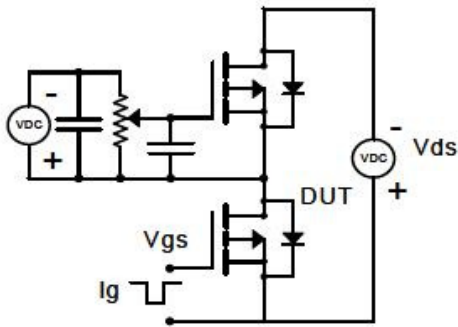




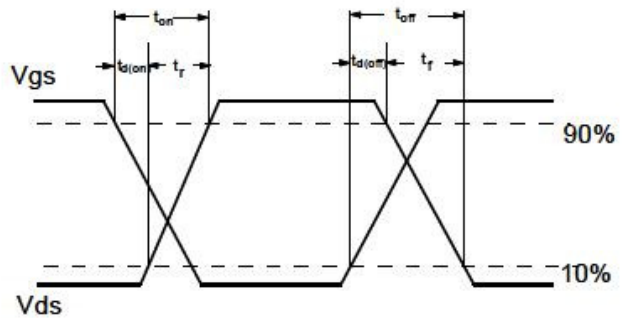
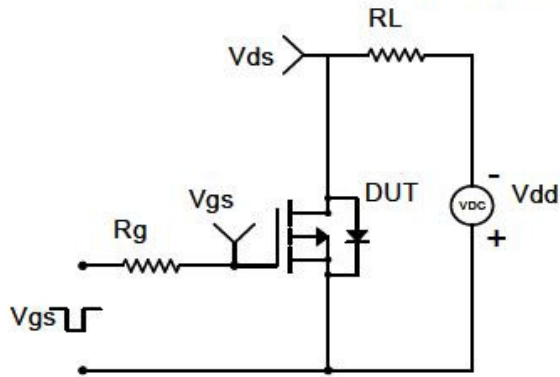


**Typical Characteristics ( P-Channel )**

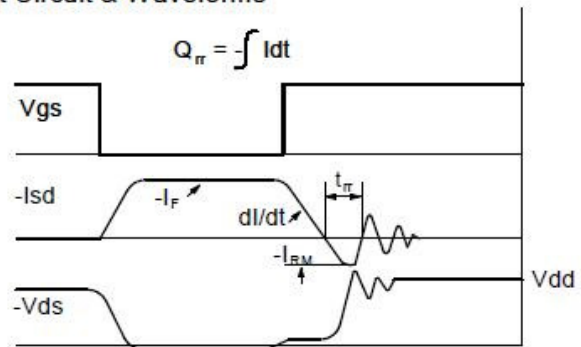
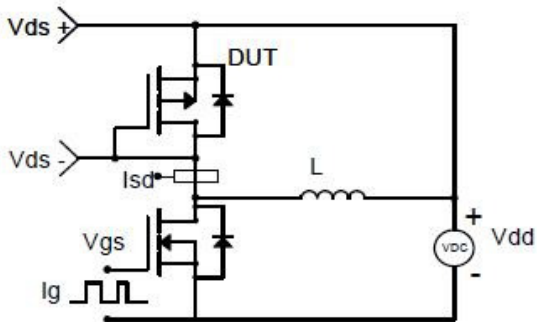
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

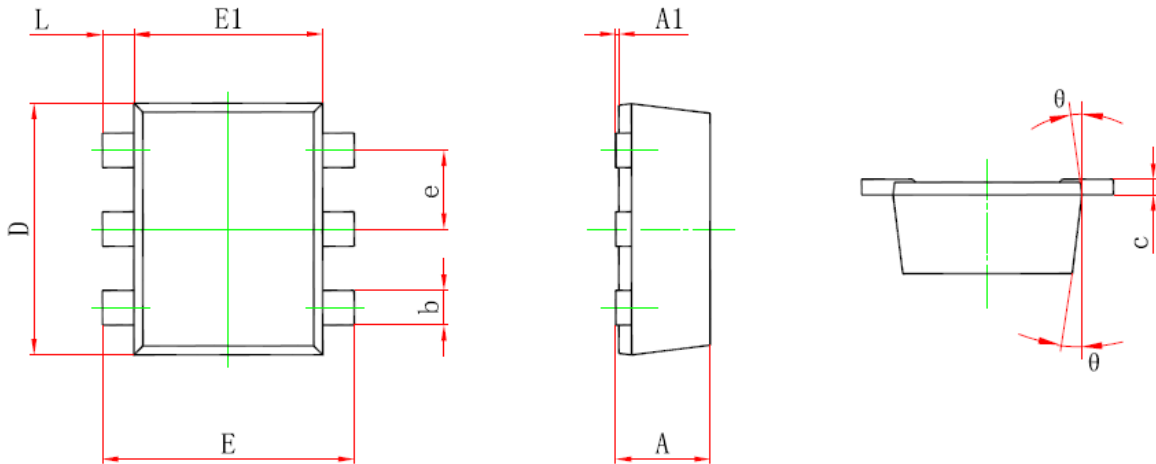


Diode Recovery Test Circuit & Waveforms





**Package Information ( SOT-563 )**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.525	0.600	0.021	0.024
A1	0.000	0.050	0.000	0.002
e	0.450	0.550	0.018	0.022
c	0.090	0.160	0.004	0.006
D	1.500	1.700	0.059	0.067
b	0.170	0.270	0.007	0.011
E1	1.100	1.300	0.043	0.051
E	1.500	1.700	0.059	0.067
L	0.100	0.300	0.004	0.012
$\theta$	7 <sup>0</sup> REF.		7 <sup>0</sup> REF.	

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