



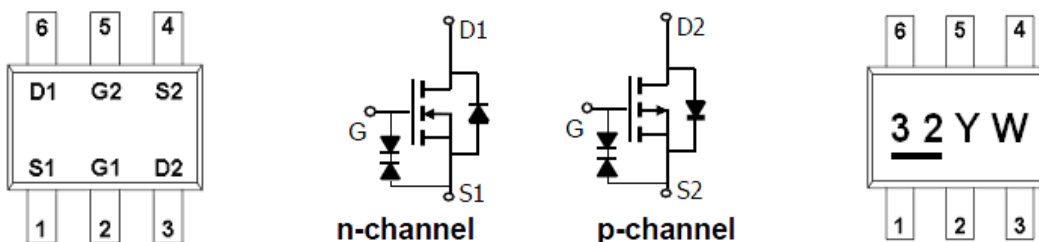
### General Description

AFC6332ES, 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  
20V/0.7A,  $R_{DS(ON)}=320m\Omega@V_{GS}=4.5V$   
20V/0.6A,  $R_{DS(ON)}=420m\Omega@V_{GS}=2.5V$   
20V/0.5A,  $R_{DS(ON)}=580m\Omega@V_{GS}=1.8V$
- P-Channel  
-20V/-0.6A,  $R_{DS(ON)}= 580 m\Omega@ V_{GS}=-4.5V$   
-20V/-0.5A,  $R_{DS(ON)}= 780 m\Omega@ V_{GS}=-2.5V$   
-20V/-0.4A,  $R_{DS(ON)}= 980 m\Omega@ V_{GS}=-1.8V$
- Super high density cell design
- ESD Protection Diode design-in
- SOT-363 package design

### Pin Description ( SOT-363 )



### 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
AFC6332ESS36RG	32YW	SOT-363	Tape & Reel	3000 EA

- ※ 32 parts code
- ※ Y year code ( 0 ~ 9 )
- ※ W week code ( A ~ Z = 1 ~ 26 / a ~ z = 27 ~ 52 )
- ※ AFC6332ESS36RG : 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	$V_{DSS}$	20	-20	V
Gate –Source Voltage	$V_{GSS}$	$\pm 12$	$\pm 12$	V
Continuous Drain Current( $T_J=150^{\circ}\text{C}$ )	$I_D$	$T_A=25^{\circ}\text{C}$	1.2	A
		$T_A=70^{\circ}\text{C}$	0.9	
Pulsed Drain Current	$I_{DM}$	4	-3	A
Continuous Source Current(Diode Conduction)	$I_S$	0.6	-0.6	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	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	20			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.3		1.0	V
Gate Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 12V$			$\pm 1$	mA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=16V, V_{GS}=0V$			1	uA
		$V_{DS}=16V, V_{GS}=0V$ $T_J=85^{\circ}\text{C}$			5	
On-State Drain Current	$I_{D(on)}$	$V_{DS} \geq 5V, V_{GS}=4.5V$	1.2			A
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=0.7A$		230	320	m $\Omega$
		$V_{GS}=2.5V, I_D=0.6A$		280	420	
		$V_{GS}=1.8V, I_D=0.5A$		400	580	
Forward Transconductance	$g_{FS}$	$V_{DS}=10V, I_D=1.0A$		1		S
Diode Forward Voltage	$V_{SD}$	$I_S=1.0A, V_{GS}=0V$		0.65	1.5	V
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=10V, V_{GS}=0V$ $f=1\text{MHz}$		70		pF
Output Capacitance	$C_{oss}$			20		
Reverse Transfer Capacitance	$C_{rss}$			8		
Total Gate Charge	$Q_g$	$V_{DS}=10V, V_{GS}=4.5V$ $I_D \equiv 1.2A$		1.06	1.38	nC
Gate-Source Charge	$Q_{gs}$			0.18		
Gate-Drain Charge	$Q_{gd}$			0.32		
Turn-On Time	$t_{d(on)}$	$V_{DD}=10V, R_L=20\Omega$ $I_D \equiv 1.2A, V_{GEN}=4.5V$ $R_G=1\Omega$		18	26	ns
	$t_r$			20	28	
Turn-Off Time	$t_{d(off)}$			70	110	
	$t_f$			25	40	



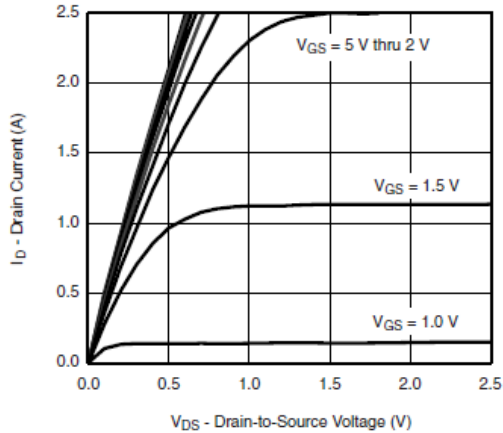
**Electrical Characteristics ( P-Channel )**

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

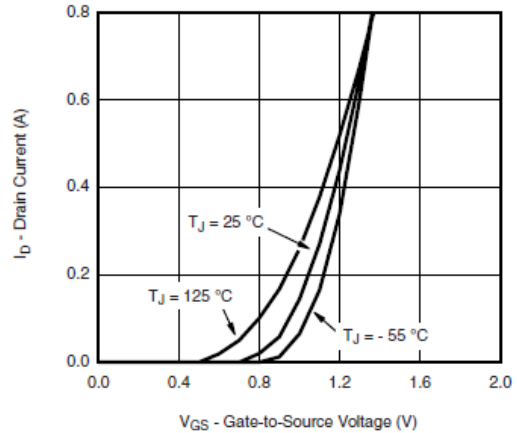
Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA	-20			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-0.3		-1.0	
Gate Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±12V			±1	mA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-16V, V <sub>GS</sub> =0V			-1	μA
		V <sub>DS</sub> =-16V, 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	0.7			A
Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-0.6A		380	580	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-0.5A		520	780	
		V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-0.4A		690	980	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =-10V, I <sub>D</sub> =-0.4A		1		S
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =-0.15A, V <sub>GS</sub> =0V		0.65	1.5	V
<b>Dynamic</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V f=1MHz		70	100	pF
Output Capacitance	C <sub>oss</sub>			20		
Reverse Transfer Capacitance	C <sub>rss</sub>			10		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-10V, V <sub>GS</sub> =-4.5V I <sub>D</sub> ≡-0.25A		1.0	1.3	nC
Gate-Source Charge	Q <sub>gs</sub>			0.1		
Gate-Drain Charge	Q <sub>gd</sub>			0.3		
Turn-On Time	t <sub>d(on)</sub>	V <sub>DD</sub> =-10V, R <sub>L</sub> =30Ω I <sub>D</sub> ≡-0.2A, V <sub>GEN</sub> =-4.5V R <sub>G</sub> =10Ω		10	15	ns
	t <sub>r</sub>			10	15	
Turn-Off Time	t <sub>d(off)</sub>			40	60	
	t <sub>f</sub>			30	50	



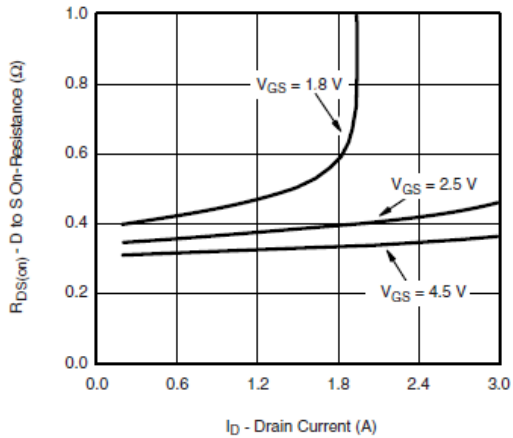
## Typical Characteristics ( N-Channel )



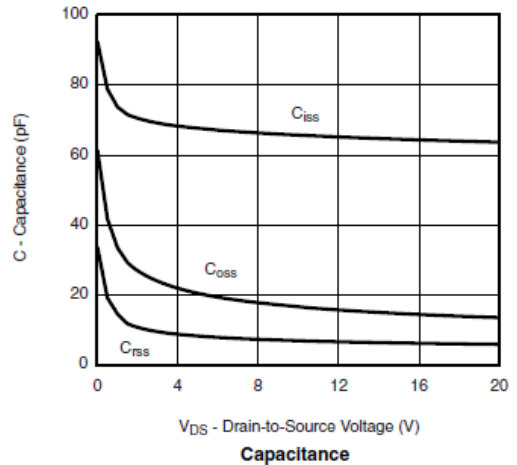
Output Characteristics



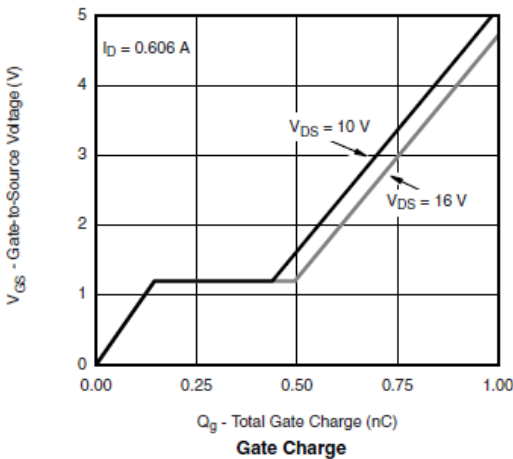
Transfer Characteristics



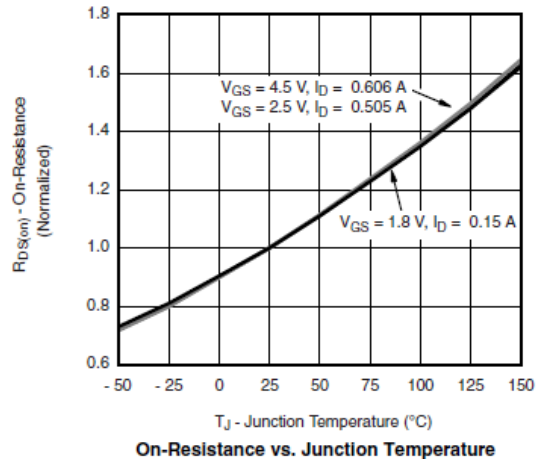
On-Resistance vs. Drain Current



Capacitance



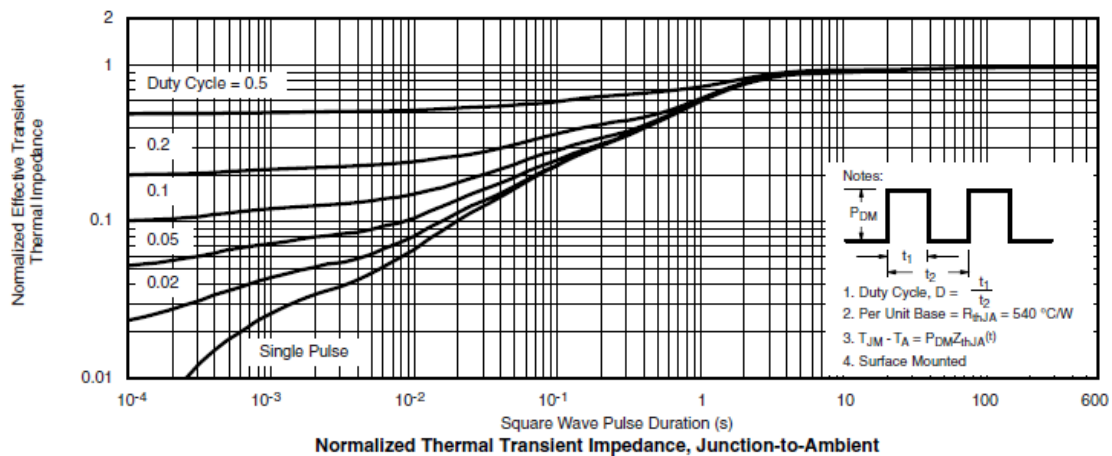
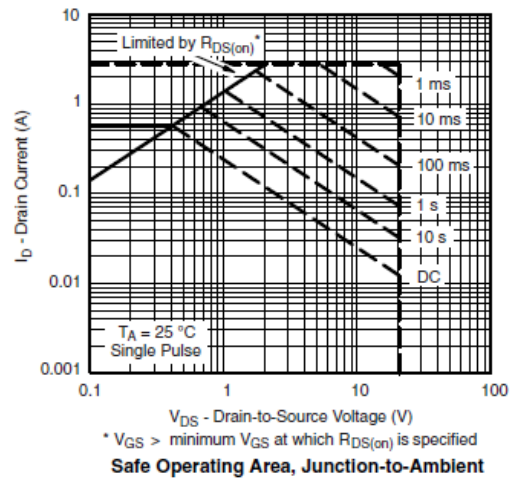
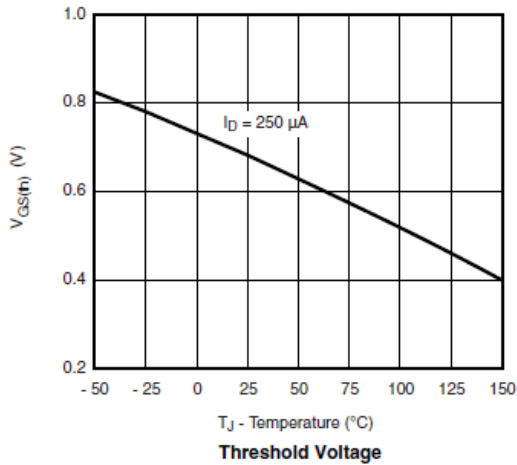
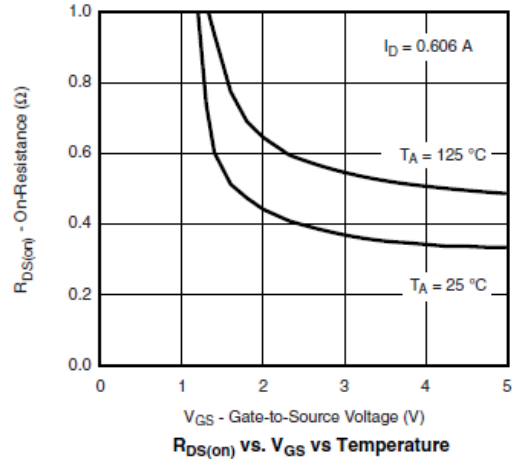
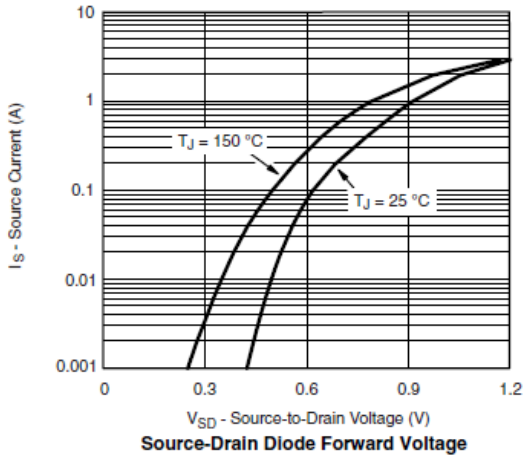
Gate Charge



On-Resistance vs. Junction Temperature



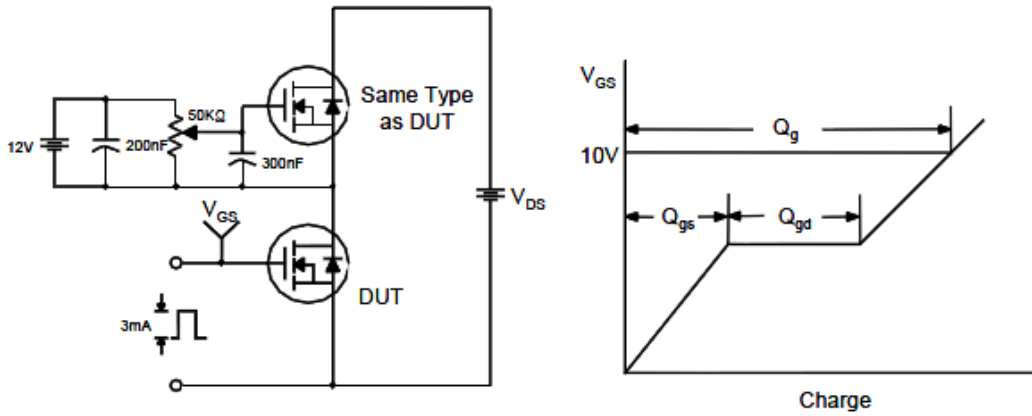
## Typical Characteristics ( N-Channel )



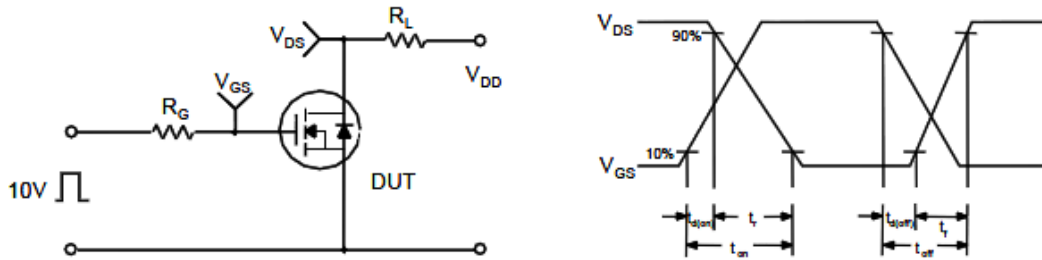


Typical Characteristics ( N-Channel )

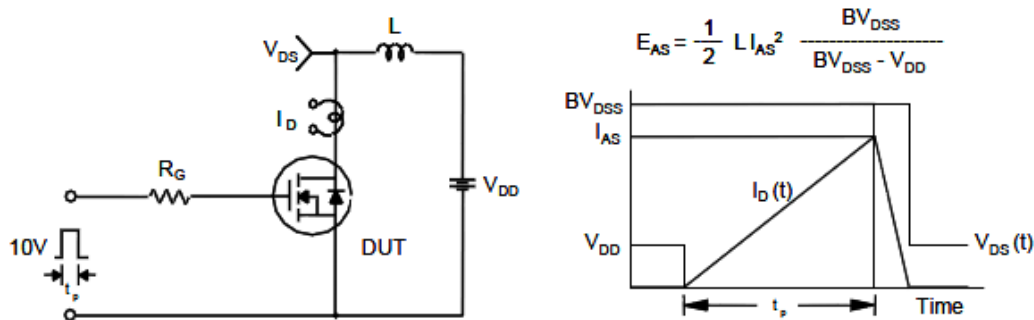
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

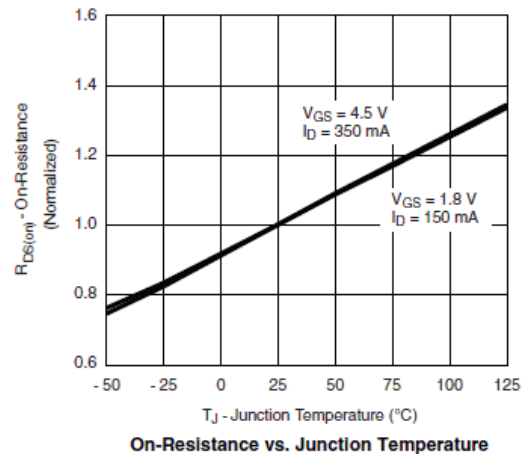
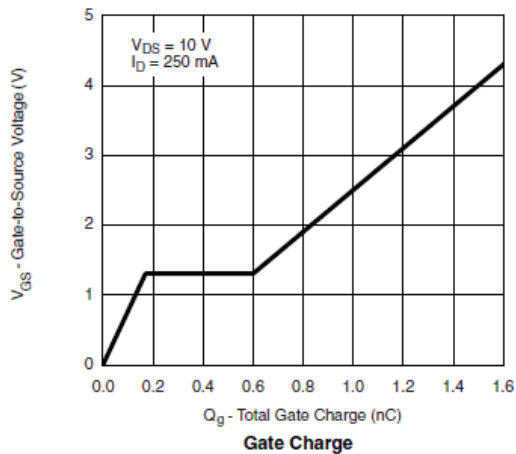
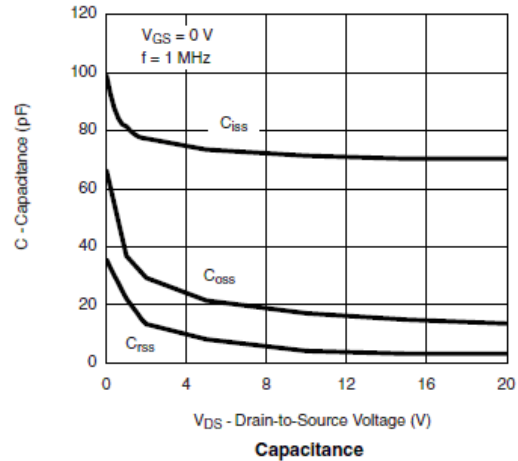
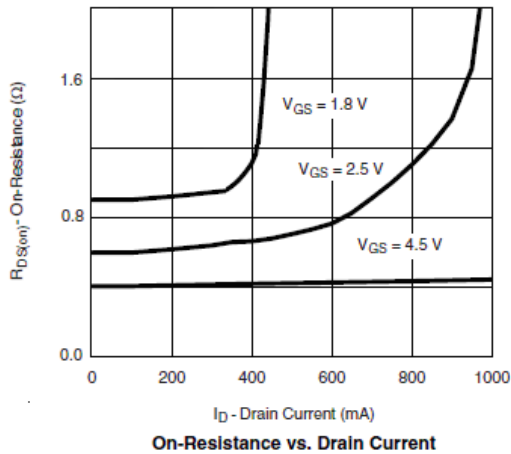
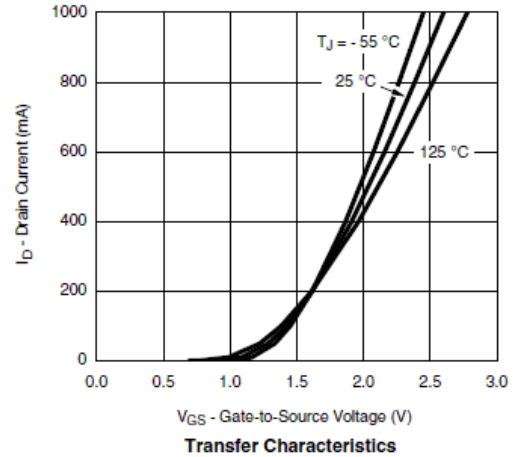
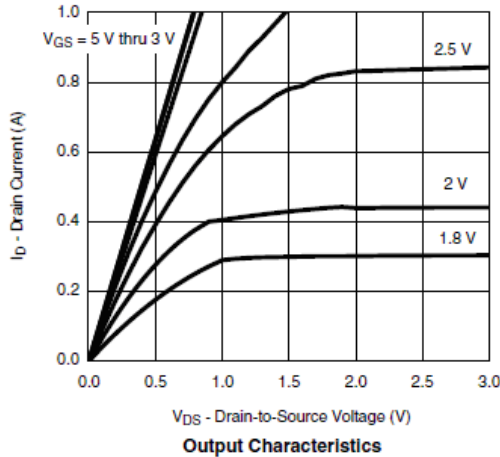


Unclamped Inductive Switching Test Circuit & Waveforms



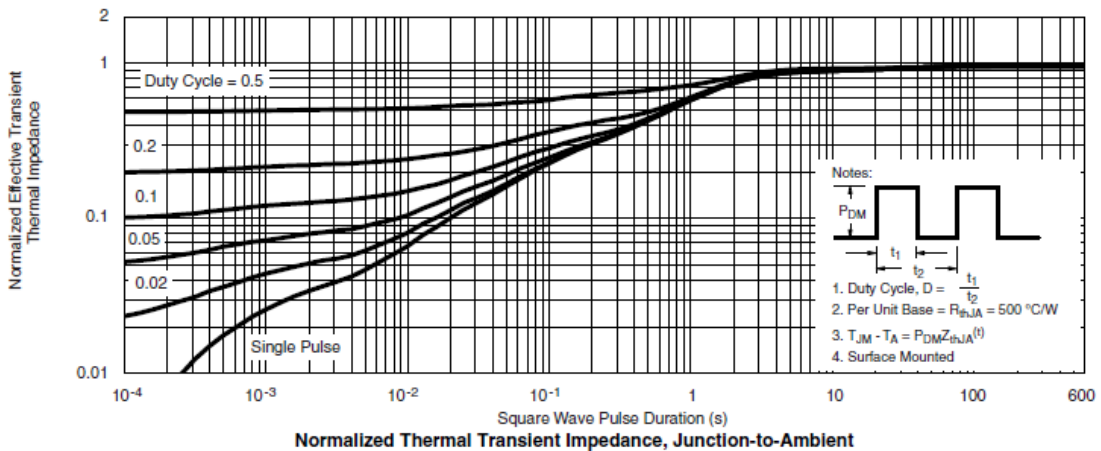
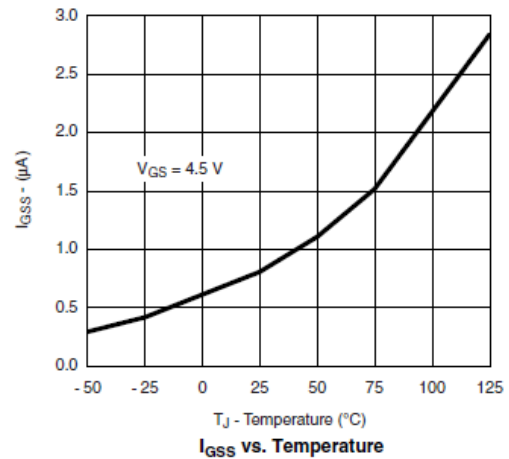
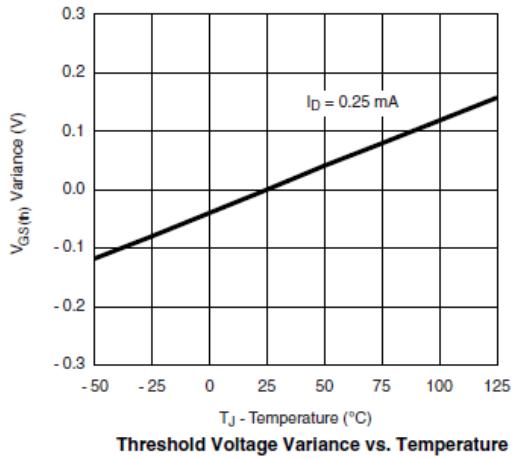
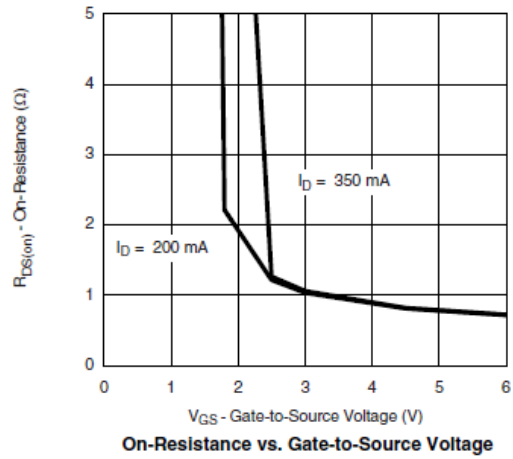
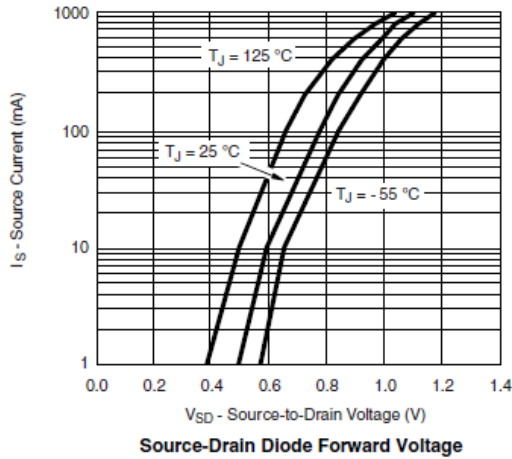


## Typical Characteristics ( P-Channel )





**Typical Characteristics ( P-Channel )**

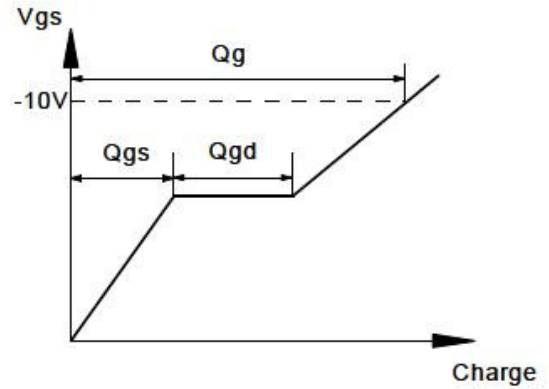
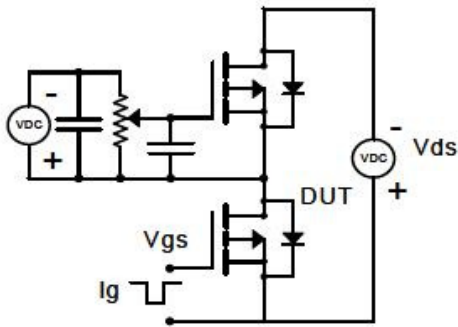




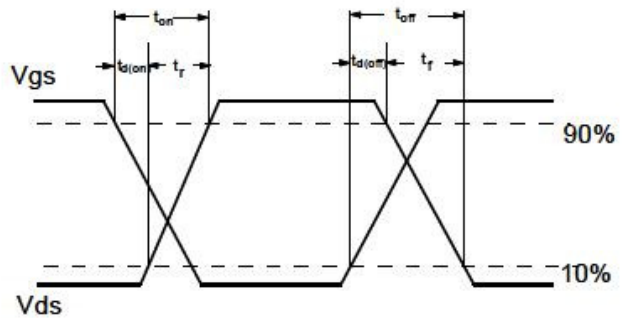
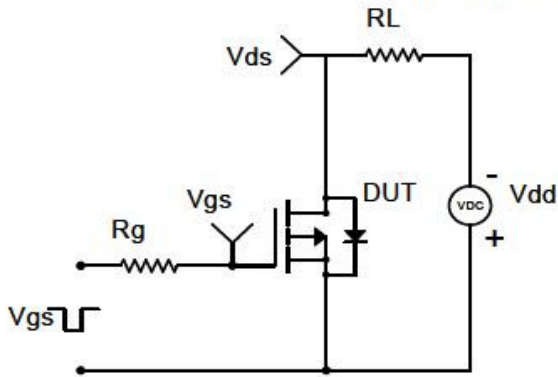


**Typical Characteristics ( P-Channel )**

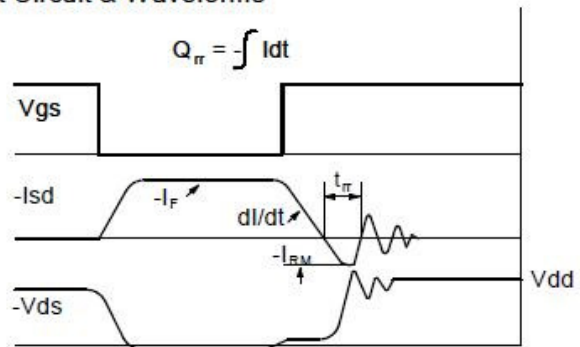
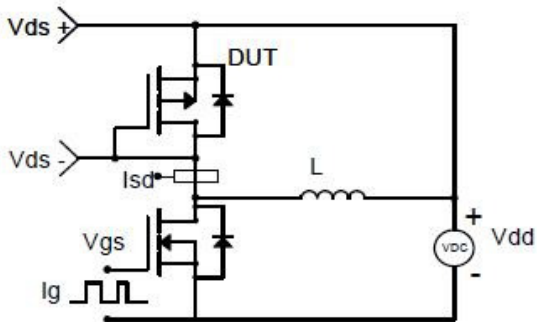
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

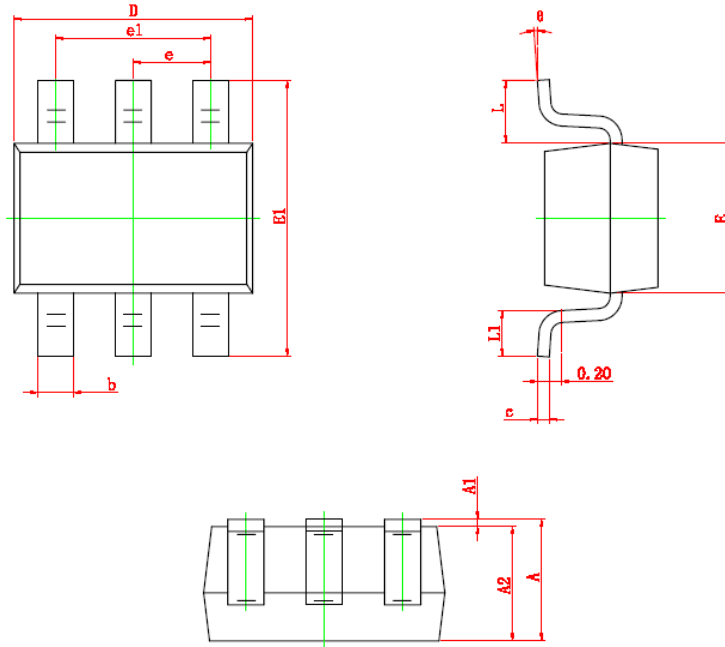


Diode Recovery Test Circuit & Waveforms





**Package Information ( SOT-363 )**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

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