



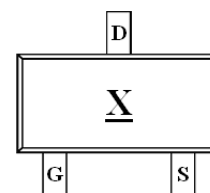
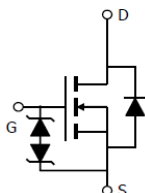
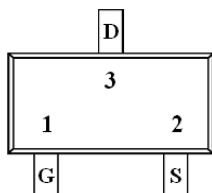
### General Description

AFN1012E, N-Channel 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 low in-line power loss are needed in commercial industrial surface mount applications.

### Features

- 20V/0.6A,  $R_{DS(ON)}=360m\Omega@V_{GS}=4.5V$
- 20V/0.5A,  $R_{DS(ON)}=420m\Omega@V_{GS}=2.5V$
- 20V/0.4A,  $R_{DS(ON)}=560m\Omega@V_{GS}=1.8V$
- Low Offset (Error) Voltage
- Low-Voltage Operation
- High-Speed Circuits
- Low Battery Voltage Operation
- **ESD Protected**
- SOT-523 package design

### Pin Description ( SOT-523 )



### Application

- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories
- Battery Operated Systems
- Power Supply Converter Circuits
- Load/Power Switching Smart Phones, Pagers

### Pin Define

Pin	Symbol	Description
1	G	Gate
2	S	Source
3	D	Drain

### Ordering Information

Part Ordering No.	Part Marking	Package	Unit	Quantity
AFN1012ES52RG	X	SOT-523	Tape & Reel	3000 EA

※ AFN1012ES52RG : 7" Tape & Reel ; Pb- Free ; Halogen -Free



### Absolute Maximum Ratings

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	20	V
Gate-Source Voltage	$V_{GSS}$	$\pm 12$	V
Continuous Drain Current( $T_J=150^\circ\text{C}$ )	$I_D$	$T_A=25^\circ\text{C}$	0.7
		$T_A=70^\circ\text{C}$	0.4
Pulsed Drain Current	$I_{DM}$	1.0	A
Continuous Source Current(Diode Conduction)	$I_S$	0.3	A
Power Dissipation	$P_D$	$T_A=25^\circ\text{C}$	0.27
		$T_A=70^\circ\text{C}$	0.16
Operating Junction Temperature	$T_J$	-55/150	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-55/150	$^\circ\text{C}$

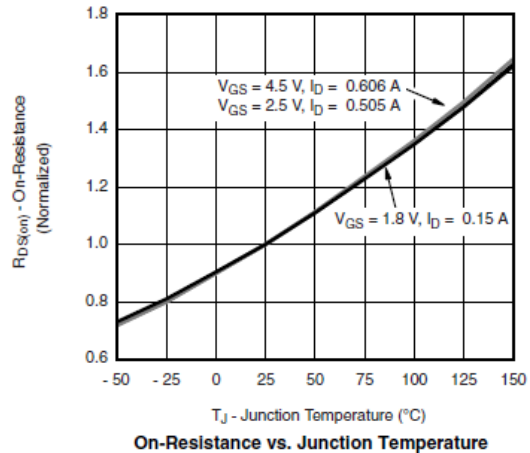
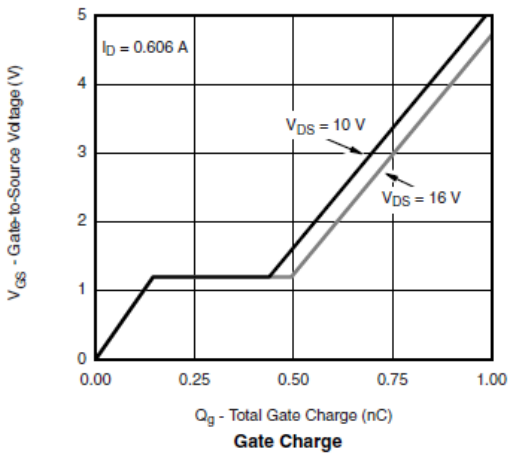
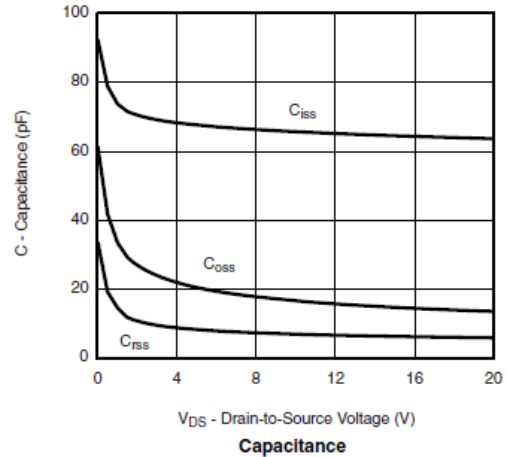
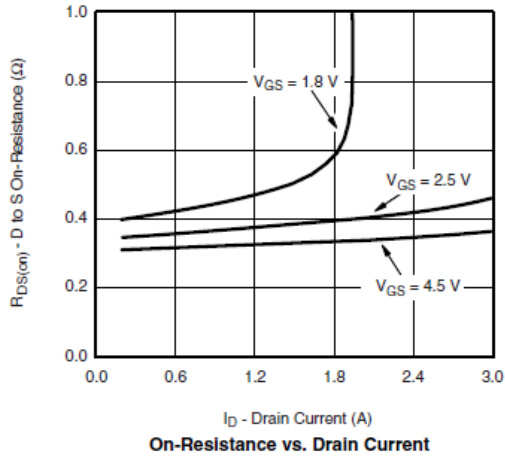
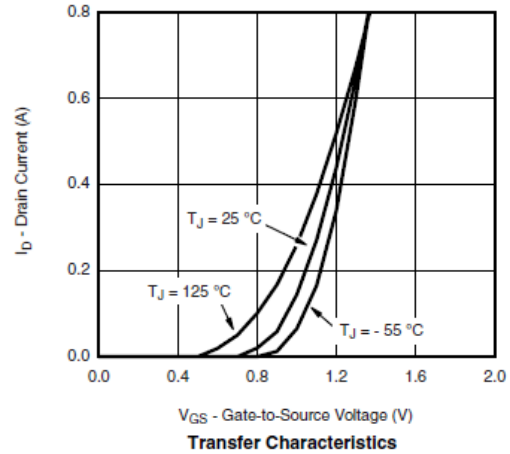
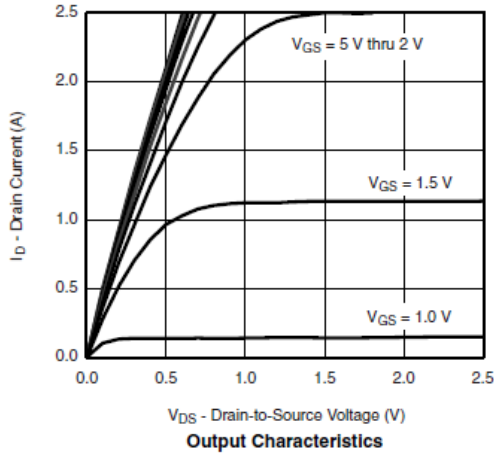
### Electrical Characteristics

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

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu\text{A}$	20			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	0.3		0.8	
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	$I_{D(on)}$	$V_{DS} \geq 5V, V_{GS}=4.5V$	0.7			A
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=0.6A$		240	360	m $\Omega$
		$V_{GS}=2.5V, I_D=0.5A$		300	420	
		$V_{GS}=1.8V, I_D=0.4A$		420	560	
Forward Transconductance	$g_{FS}$	$V_{DS}=10V, I_D=0.4A$		1		S
Diode Forward Voltage	$V_{SD}$	$I_S=0.15A, V_{GS}=0V$		0.65	1.2	V
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=10V, V_{GS}=0V$ $f=1\text{MHz}$		70		pF
Output Capacitance	$C_{oss}$			20		
Reverse Transfer Capacitance	$C_{rss}$			8		
Total Gate Charge	$Q_g$	$V_{DS}=10V, V_{GS}=4.5V$ $I_D=0.6A$		1.06	1.38	nC
Gate-Source Charge	$Q_{gs}$			0.18		
Gate-Drain Charge	$Q_{gd}$			0.32		
Turn-On Time	$t_{d(on)}$	$V_{DD}=10V, R_L=20\Omega$ $I_D=0.5A, V_{GEN}=4.5V$ $R_G=1\Omega$		18	26	ns
	$t_r$			20	28	
Turn-Off Time	$t_{d(off)}$			70	110	
	$t_f$			25	40	

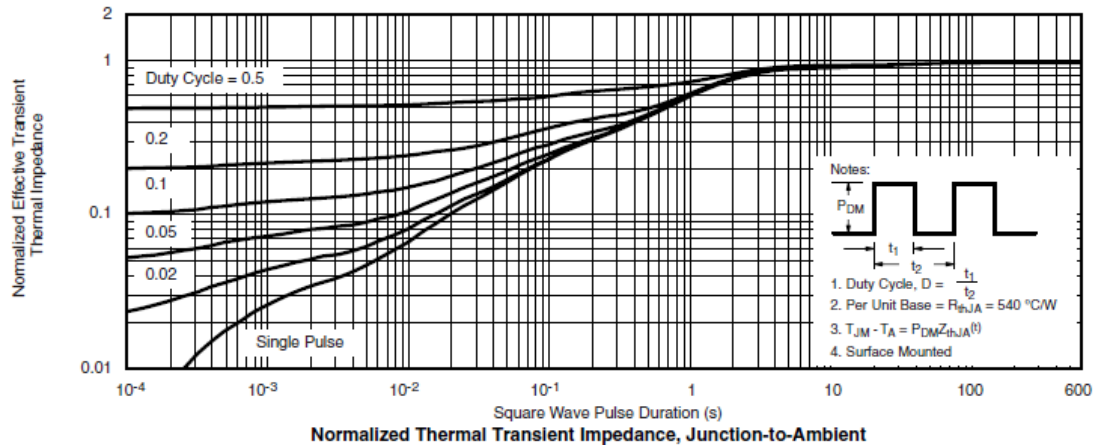
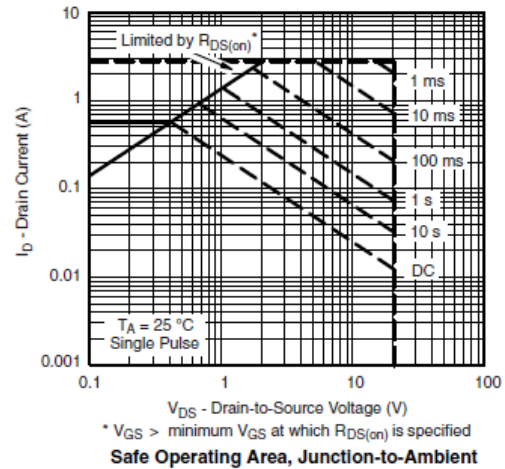
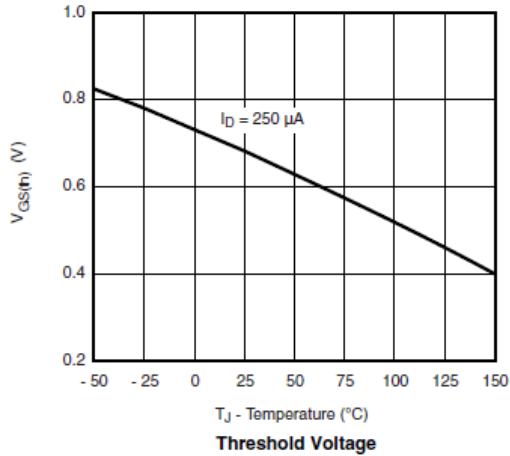
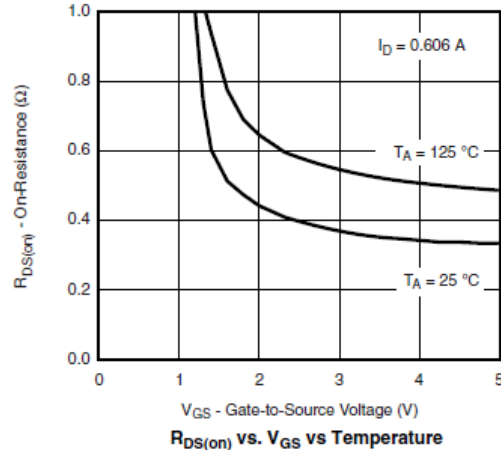
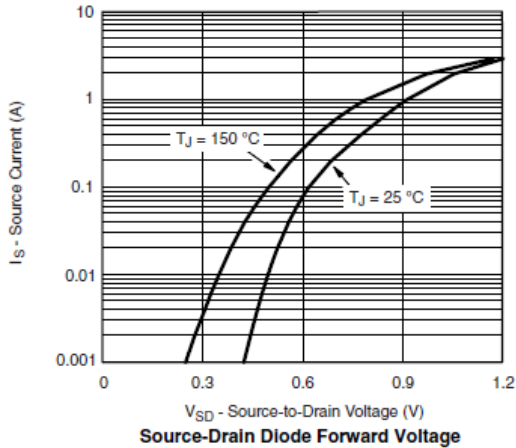


## Typical Characteristics





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## Typical Characteristics

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

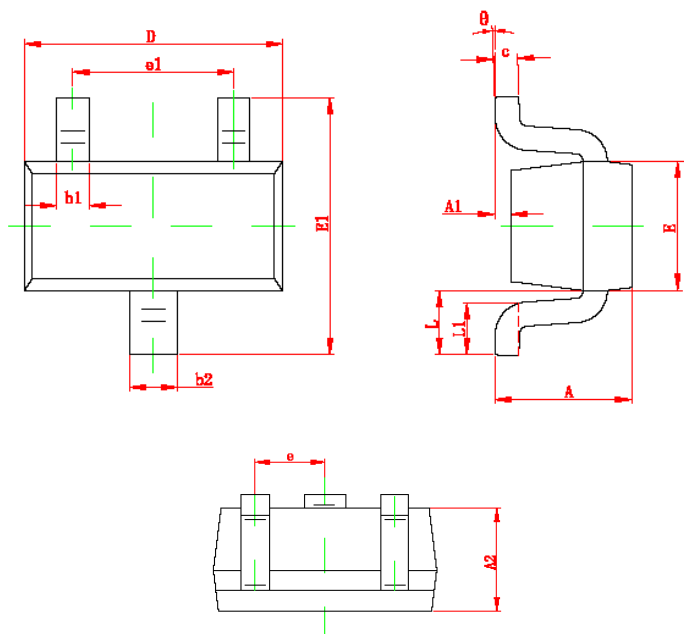


Unclamped Inductive Switching Test Circuit & Waveforms





**Package Information ( SOT-523 )**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.700	0.900	0.028	0.035
A1	0.000	0.100	0.000	0.004
A2	0.700	0.800	0.028	0.031
b1	0.150	0.250	0.006	0.010
b2	0.250	0.325	0.010	0.013
c	0.100	0.200	0.004	0.008
D	1.500	1.700	0.059	0.067
E	0.750	0.850	0.030	0.033
E1	1.450	1.750	0.057	0.069
e	0.500 TYP		0.020 TYP	
e1	0.900	1.100	0.035	0.043
L	0.550 REF		0.022 REF	
L1	0.280	0.440	0.011	0.017
θ	0°	4°	0°	4°

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