



### General Description

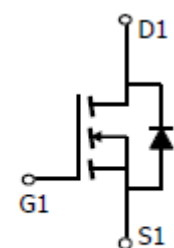
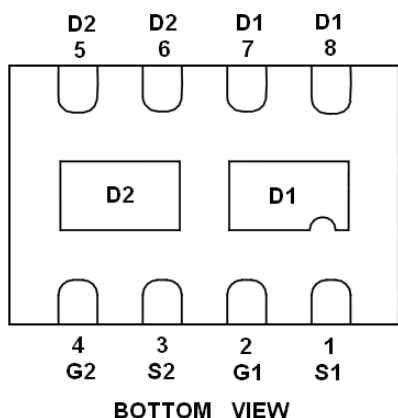
AFC4604W, N-Channel enhancement mode MOSFET, uses Advanced Trench Technology to provide excellent  $R_{DS(ON)}$ , low gate charge.

These devices are particularly suited for low voltage power management, such as smart phone and notebook computer and other battery powered circuits, and low in-line power loss are needed in commercial industrial surface mount applications.

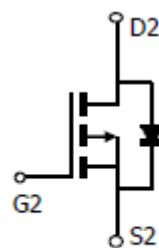
### Features

- N-Channel  
 $I_D=4.5A, R_{DS(on)}=38m\Omega@V_{GS}=4.5V$   
 $I_D=3.6A, R_{DS(on)}=48m\Omega@V_{GS}=2.5V$   
 $I_D=2.4A, R_{DS(on)}=68m\Omega@V_{GS}=1.8V$
- P-Channel  
 $I_D=-4.5A, R_{DS(on)}=80m\Omega@V_{GS}=-4.5V$   
 $I_D=-3.8A, R_{DS(on)}=105m\Omega@V_{GS}=-2.5V$   
 $I_D=-2.5A, R_{DS(on)}=145m\Omega@V_{GS}=-1.8V$
- Super high density cell design for extremely low  $R_{DS(ON)}$
- Exceptional on-resistance and maximum DC current capability
- DFN3X2-8L package design

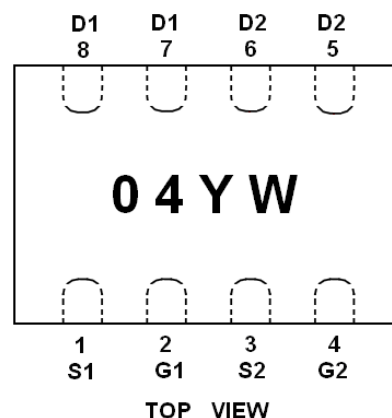
### Pin Description ( DFN3X2-8L )



**n-channel**



**p-channel**



### Application

- Load Switch
- Portable Equipment
- Battery Powered System



**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
AFC4604WFN328RG	04YW	DFN3X2-8L	Tape & Reel	4000 EA

※ Y year code

※ W week code

※ AFC4604WFN328RG : 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( $T_J=150^{\circ}\text{C}$ )	$I_D$	$T_A=25^{\circ}\text{C}$	4.5	-4.5	A
		$T_A=70^{\circ}\text{C}$	2.4	-2.4	
Pulsed Drain Current	$I_{DM}$	20	-15	A	
Continuous Source Current(Diode Conduction)	$I_S$	2.0	-2.0	A	
Power Dissipation	$P_D$	$T_A=25^{\circ}\text{C}$	6.5		W
		$T_A=70^{\circ}\text{C}$	4.2		
Operating Junction Temperature	$T_J$	150		$^{\circ}\text{C}$	
Storage Temperature Range	$T_{STG}$	-55/150		$^{\circ}\text{C}$	
Thermal Resistance-Junction to Ambient	$R_{\theta JA}$	120		$^{\circ}\text{C}/\text{W}$	



**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	20			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	0.3		0.8	
Gate Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±12V			±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =16V, V <sub>GS</sub> =0V			1	uA
		V <sub>DS</sub> =16V, V <sub>GS</sub> =0V T <sub>J</sub> =85°C			10	
On-State Drain Current	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ 5V, V <sub>GS</sub> =4.5V	6			A
		V <sub>DS</sub> ≥ 5V, V <sub>GS</sub> =2.5V	4			
Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =4.5A		28	38	mΩ
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =3.6A		35	48	
		V <sub>GS</sub> =1.8V, I <sub>D</sub> =2.4A		50	68	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =3.6A		10		S
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =1.6A, V <sub>GS</sub> =0V		0.85	1.2	V
<b>Dynamic</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =4.5V I <sub>D</sub> ≧3.6A		4.2	5.0	nC
Gate-Source Charge	Q <sub>gs</sub>			0.6		
Gate-Drain Charge	Q <sub>gd</sub>			0.4		
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V f=1MHz		340		pF
Output Capacitance	C <sub>oss</sub>			115		
Reverse Transfer Capacitance	C <sub>rss</sub>			33		
Turn-On Time	t <sub>d(on)</sub>	V <sub>DD</sub> =10V, R <sub>L</sub> =2.8Ω I <sub>D</sub> ≧3.6A, V <sub>GEN</sub> =4.5V R <sub>G</sub> =1Ω		8	15	ns
	t <sub>r</sub>			8	15	
Turn-Off Time	t <sub>d(off)</sub>			25	40	
	t <sub>f</sub>		8	15		



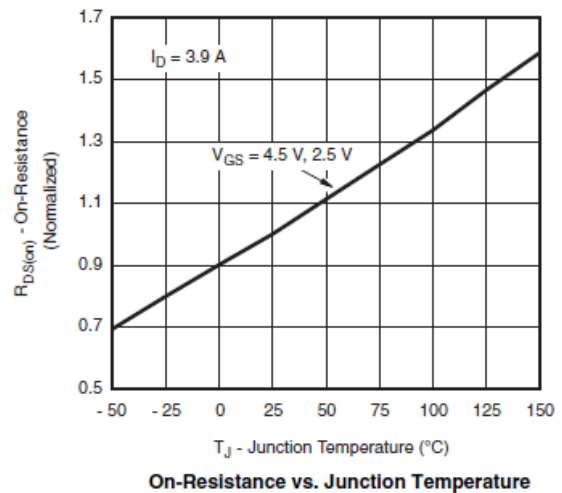
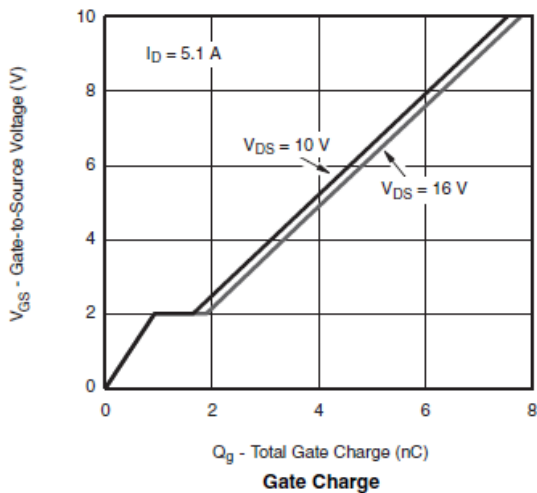
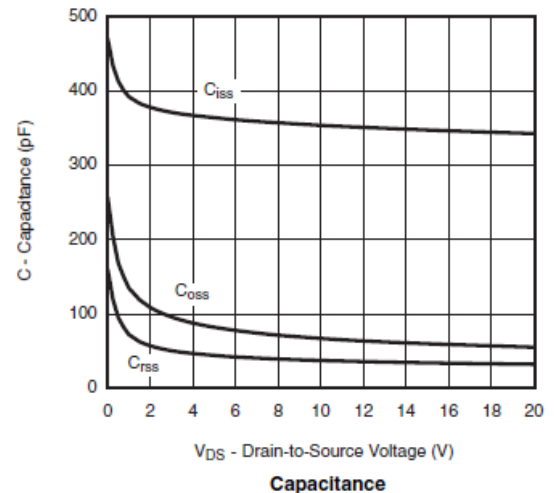
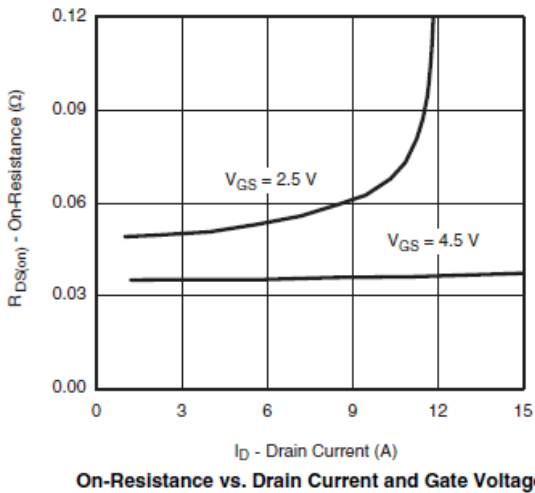
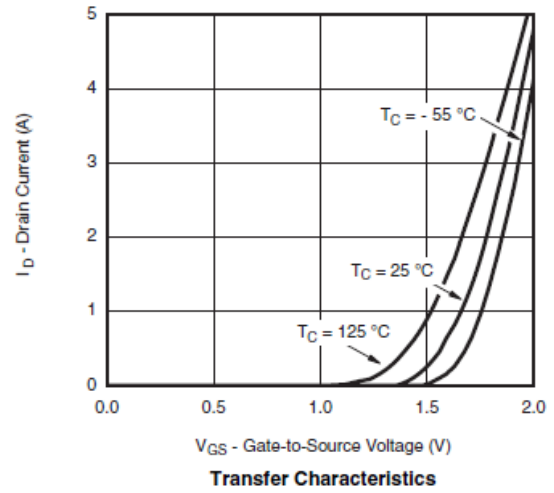
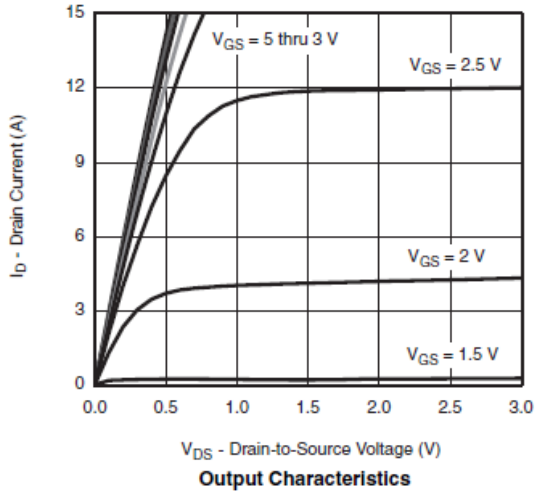
**Electrical Characteristics ( P-Channel )**

(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	-20			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA	-0.3		-0.8	
Gate Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±12V			±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-16V, V <sub>GS</sub> =0V			-1	uA
		V <sub>DS</sub> =-16V, V <sub>GS</sub> =0V T <sub>J</sub> =85°C			-30	
On-State Drain Current	I <sub>D(on)</sub>	V <sub>DS</sub> ≤ -5V, V <sub>GS</sub> =-4.5V	-8			A
		V <sub>DS</sub> ≤ -5V, V <sub>GS</sub> =-2.5V	-3			
Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4.5A		60	80	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-3.8A		80	105	
		V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-2.5A		115	145	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =-5V, I <sub>D</sub> =-2.8A		6.5		S
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =-1.25A, V <sub>GS</sub> =0V		-0.75	-1.3	V
<b>Dynamic</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-10V, V <sub>GS</sub> =-4.5V I <sub>D</sub> ≡-3.5A		5	10	nC
Gate-Source Charge	Q <sub>gs</sub>			0.85		
Gate-Drain Charge	Q <sub>gd</sub>			1.5		
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V f=1MHz		375		pF
Output Capacitance	C <sub>oss</sub>			80		
Reverse Transfer Capacitance	C <sub>rss</sub>			60		
Turn-On Time	t <sub>d(on)</sub>	V <sub>DD</sub> =-10V, R <sub>L</sub> =2.85Ω I <sub>D</sub> ≡-3.5A, V <sub>GEN</sub> =-4.5V R <sub>G</sub> =1Ω		15	25	ns
	t <sub>r</sub>			36	60	
Turn-Off Time	t <sub>d(off)</sub>			25	50	
	t <sub>f</sub>			15	25	

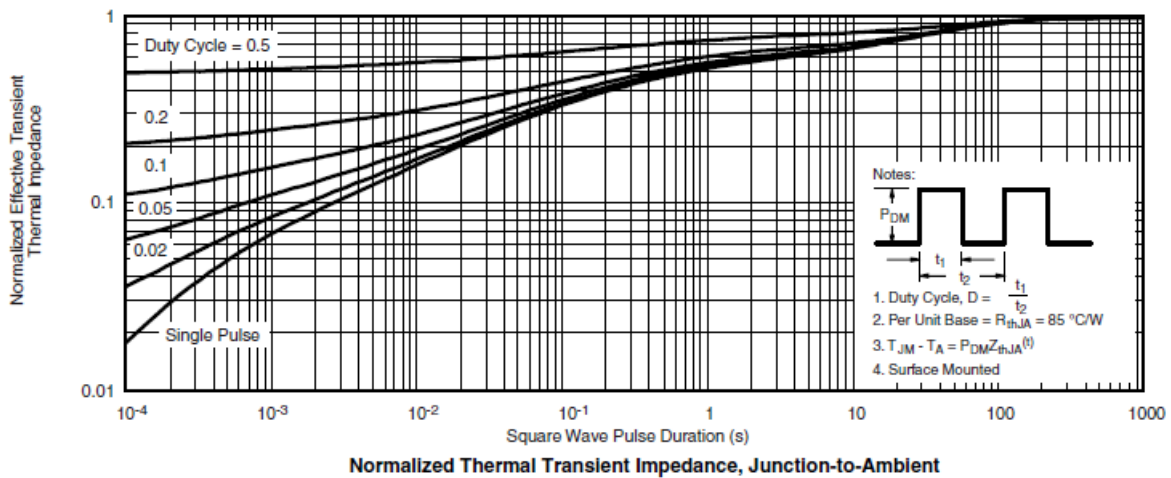
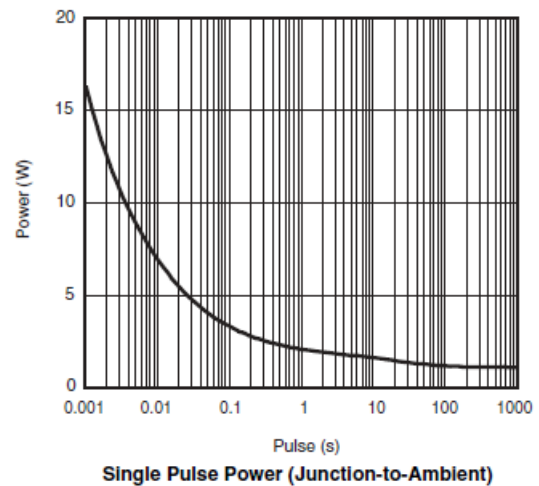
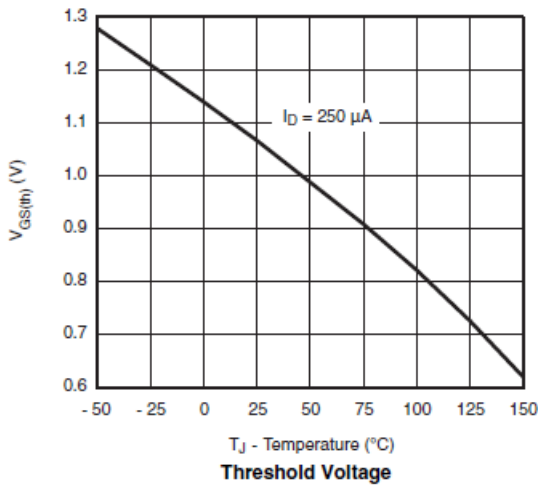
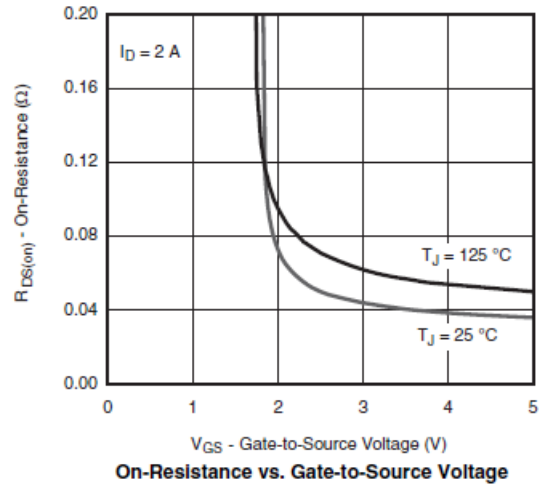
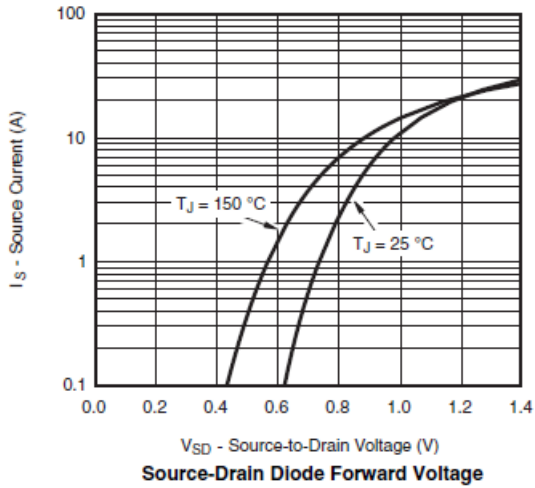


## Typical Characteristics ( N-Channel )





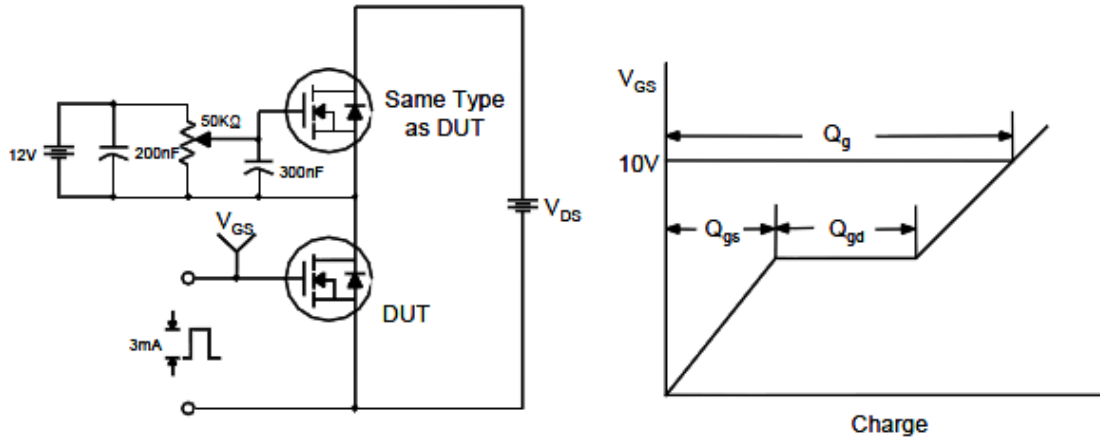
## Typical Characteristics ( N-Channel )



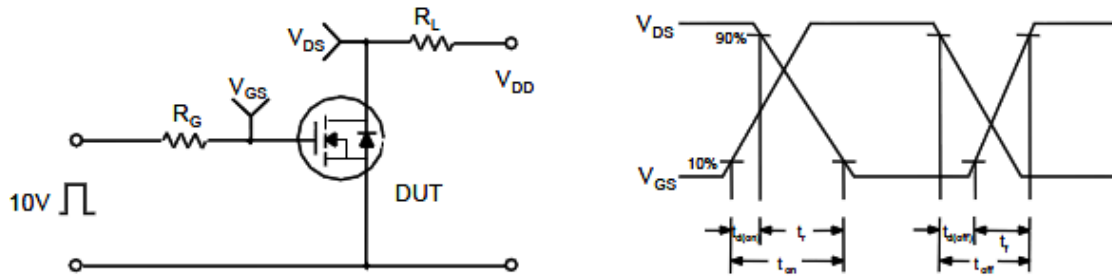


**Typical Characteristics ( N-Channel )**

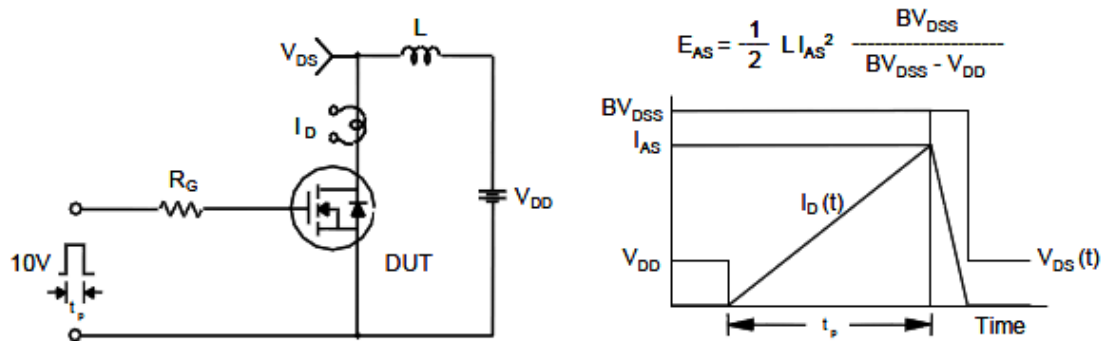
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

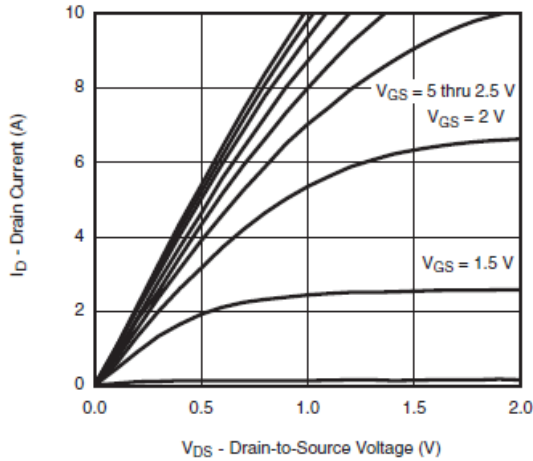


Unclamped Inductive Switching Test Circuit & Waveforms

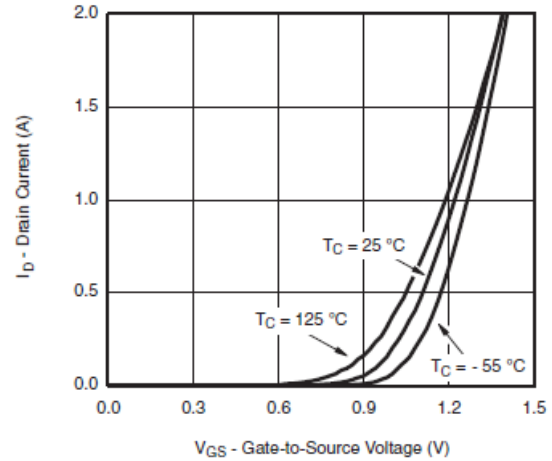




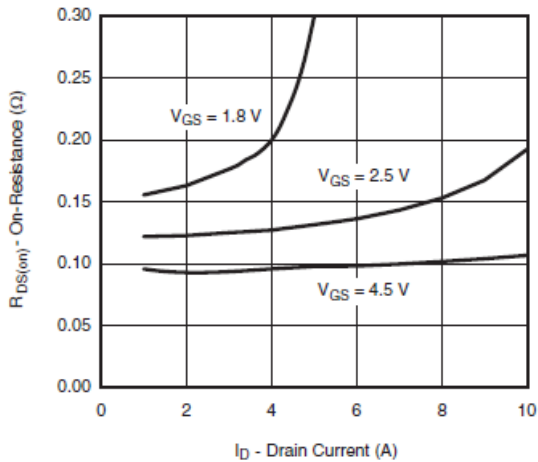
## Typical Characteristics ( P-Channel )



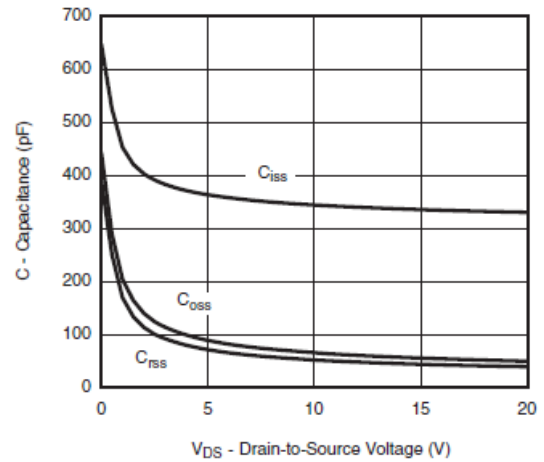
Output Characteristics



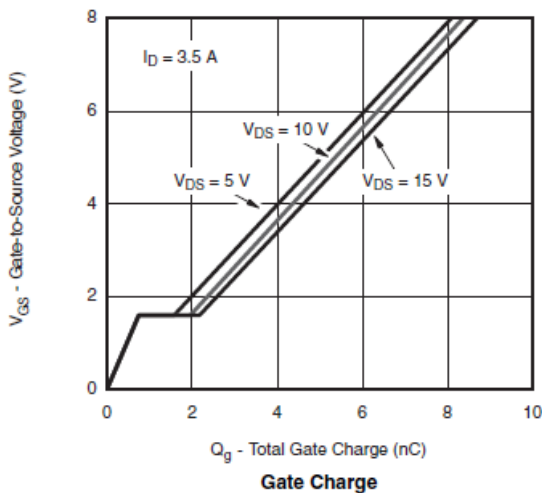
Transfer Characteristics



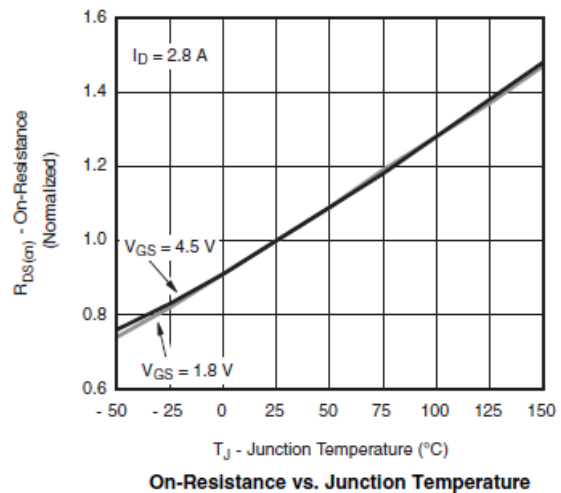
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



Gate Charge

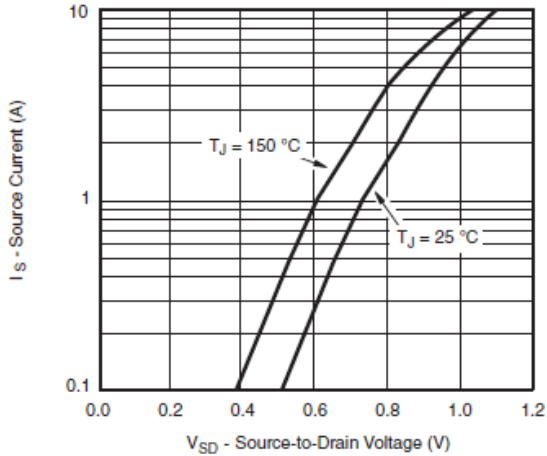


On-Resistance vs. Junction Temperature

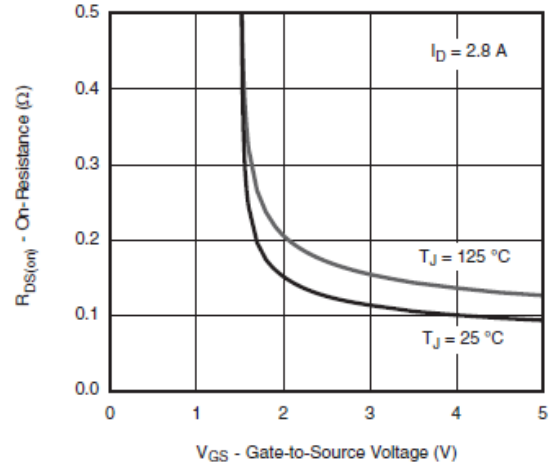




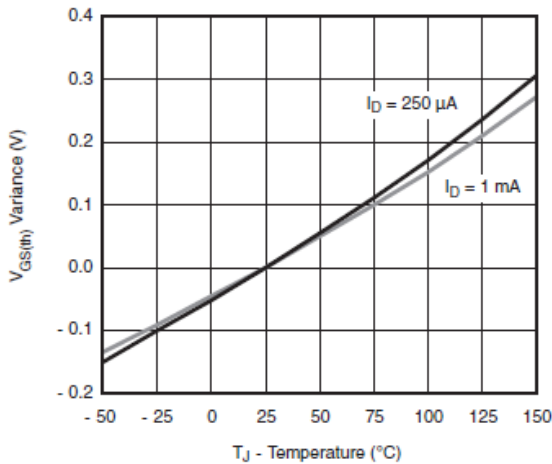
**Typical Characteristics ( P-Channel )**



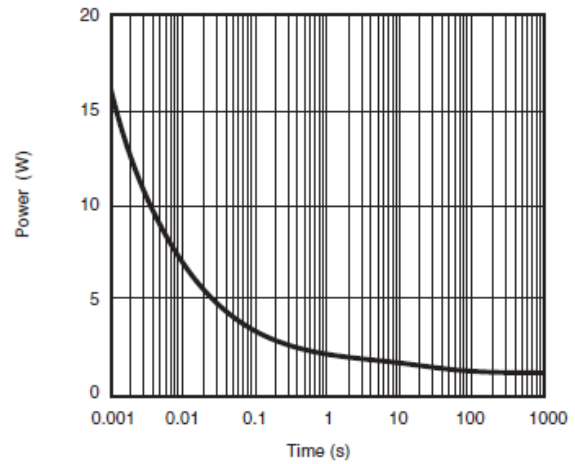
**Source-Drain Diode Forward Voltage**



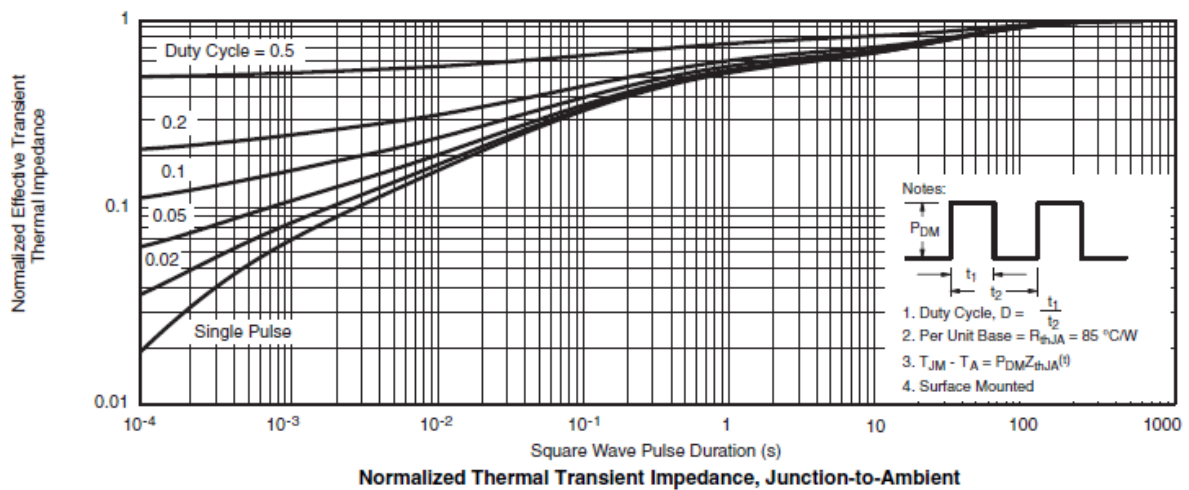
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**



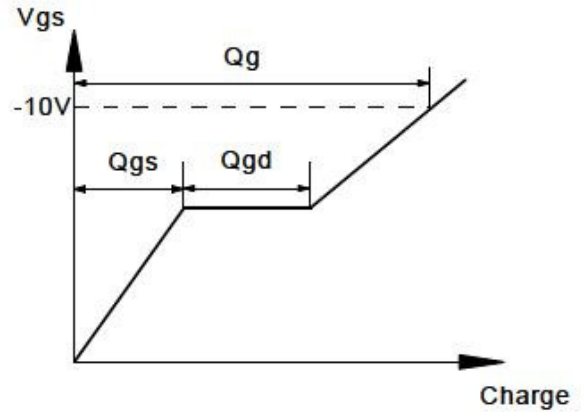
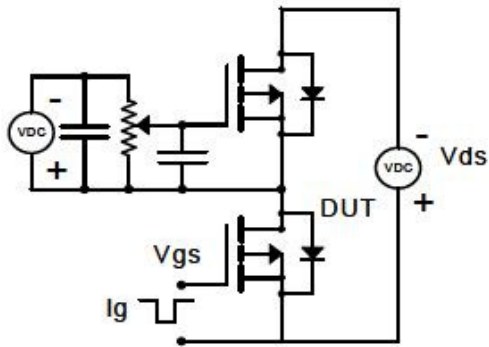
**Single Pulse Power, Junction-to-Ambient**



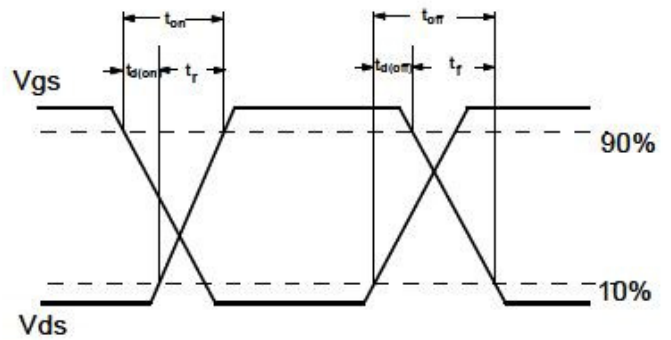
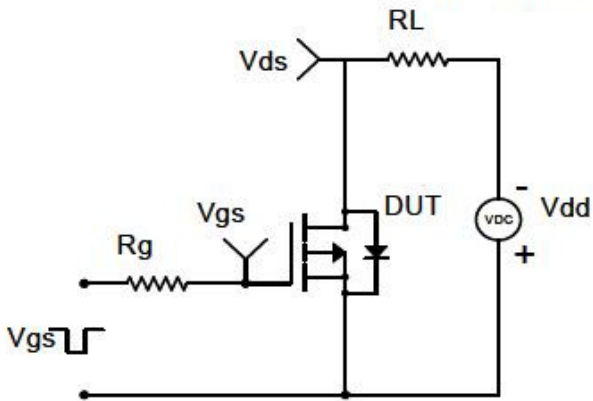


## Typical Characteristics ( P-Channel )

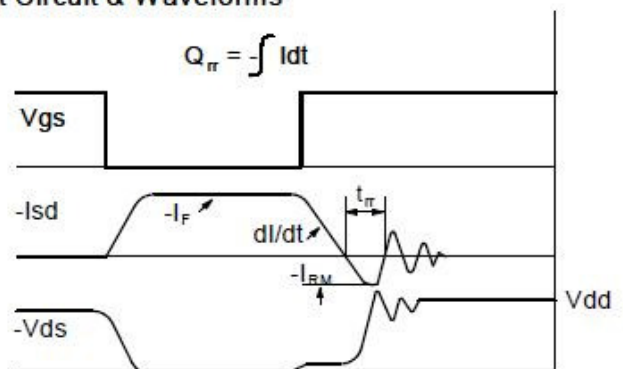
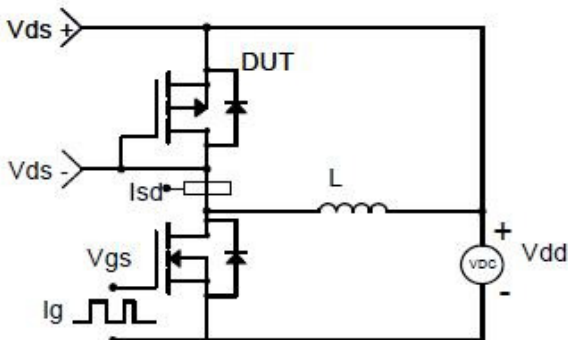
### Gate Charge Test Circuit & Waveform



### Resistive Switching Test Circuit & Waveforms

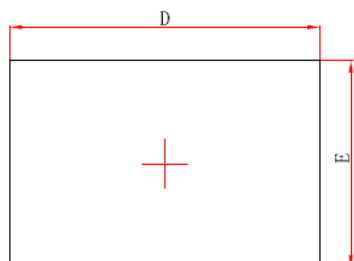


### Diode Recovery Test Circuit & Waveforms

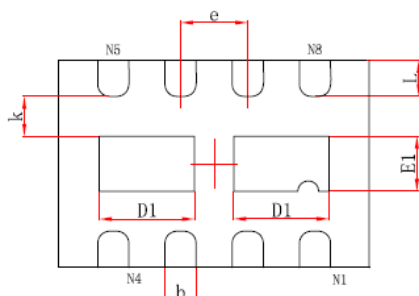




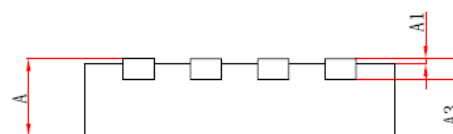
**Package Information ( DFN3X2-8L )**



Top View



Bottom View



Side View

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700/0.800	0.800/0.900	0.028/0.031	0.031/0.035
A1	0.000	0.050	0.000	0.002
A3	0.203REF.		0.008REF.	
D	2.924	3.076	0.115	0.121
E	1.924	2.076	0.076	0.082
D1	0.820	1.020	0.032	0.040
E1	0.430	0.630	0.017	0.025
k	0.200MIN.		0.008MIN.	
b	0.250	0.350	0.010	0.014
e	0.650TYP.		0.026TYP.	
L	0.274	0.426	0.011	0.017

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