



## General Description

AFC7640, N & P Pair enhancement mode MOSFET, uses Advanced Trench Technology to provide excellent RDS(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

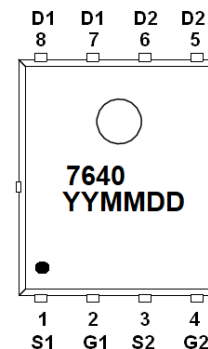
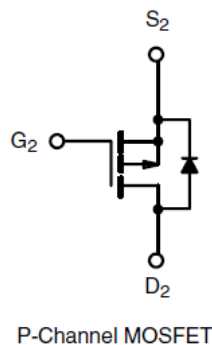
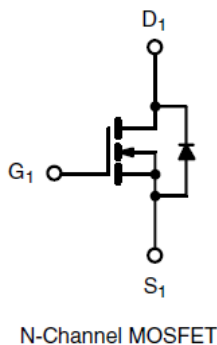
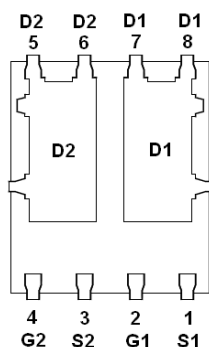
### N-Channel

- $I_D = 7.0A, R_{DS(ON)} = 30m\Omega @ V_{GS} = 10V$
- $I_D = 6.0A, R_{DS(ON)} = 35m\Omega @ V_{GS} = 4.5V$

### P-Channel

- $I_D = -7.0A, R_{DS(ON)} = 50m\Omega @ V_{GS} = -10V$
- $I_D = -6.0A, R_{DS(ON)} = 60m\Omega @ V_{GS} = -4.5V$

## Pin Description ( DFN5X6-8L )



## Application

- Point-of-Load Synchronous Rectifier  
- 5 V or 3.3 V BUS Step Down
- Synchronous Buck, Shoot-Thru Resistant

## 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
AFC7640FN568RG	7640	DFN 5X6-8L	Tape & Reel	2500 EA

- ※ 7640 : Parts Code
- ※ YYMMDD : Date Code
- ※ AFC7640FN568RG : 13" Tape & Reel ; Pb- Free ; Halogen -Free



### Absolute Maximum Ratings ( N-Channel )

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DSS</sub>	60	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	7.0
		T <sub>A</sub> =70°C	6.0
Pulsed Drain Current	I <sub>DM</sub>	30	A
Continuous Source Current(Diode Conduction)	I <sub>S</sub>	2.9	A
Power Dissipation	P <sub>D</sub>	T <sub>A</sub> =25°C	3.5
		T <sub>A</sub> =70°C	2.2
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	60			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> =60V, V <sub>GS</sub> =0V			1	uA
		V <sub>DS</sub> =60V, 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	30			A
Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =7.0A		25	30	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =6.0A		28	35	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =15V, I <sub>D</sub> =5.3A		24		S
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =3.0A, V <sub>GS</sub> =0V		0.8	1.3	V
<b>Dynamic</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =4.5V I <sub>D</sub> ≡23A		7	15	nC
Gate-Source Charge	Q <sub>gs</sub>			3.2		
Gate-Drain Charge	Q <sub>gd</sub>			3.2		
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V f=1MHz		700		pF
Output Capacitance	C <sub>oss</sub>			150		
Reverse Transfer Capacitance	C <sub>rss</sub>			70		
Turn-On Time	t <sub>d(on)</sub>	V <sub>DD</sub> =30V, R <sub>L</sub> =1.3Ω I <sub>D</sub> ≡23A, V <sub>GEN</sub> =10V R <sub>G</sub> =1Ω		10	20	ns
	t <sub>r</sub>			15	30	
Turn-Off Time	t <sub>d(off)</sub>			30	65	
	t <sub>f</sub>			25	50	



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

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DSS</sub>	-60	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	-7.0
		T <sub>A</sub> =85°C	-6.0
Pulsed Drain Current	I <sub>DM</sub>	-30	A
Continuous Source Current(Diode Conduction)	I <sub>S</sub>	-2.9	A
Power Dissipation	P <sub>D</sub>	T <sub>A</sub> =25°C	3.5
		T <sub>A</sub> =70°C	2.2
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

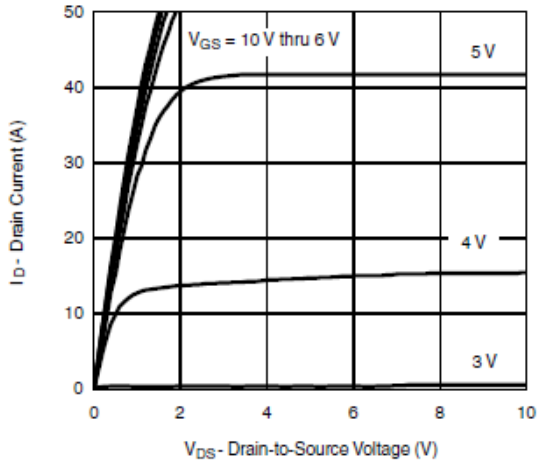
**Electrical Characteristics ( P-Channel )**

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

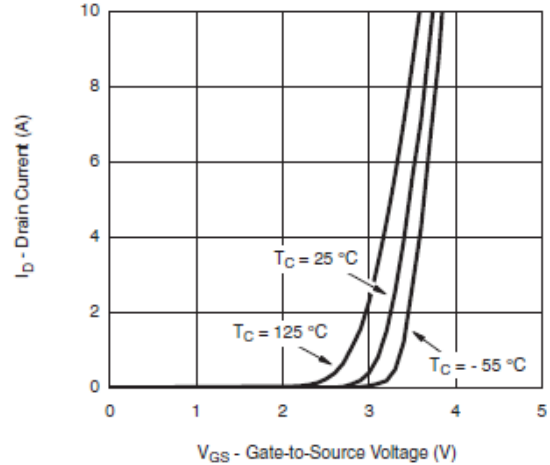
Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> = -250uA	-60			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> = -250uA	-1.0		-2.5	
Gate Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±16V			±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -48V, V <sub>GS</sub> =0V			-1	uA
		V <sub>DS</sub> = -48V, V <sub>GS</sub> =0V T <sub>J</sub> =85°C			-20	
On-State Drain Current	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ -5V, V <sub>GS</sub> = -10V	-30			A
Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = -10V, I <sub>D</sub> =-7.0A		45	50	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> =-6.0A		55	60	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = -15V, I <sub>D</sub> = -5.0A		16		S
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = -3A, V <sub>GS</sub> =0V		-0.8	-1.3	V
<b>Dynamic</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-30V, V <sub>GS</sub> =-10V I <sub>D</sub> = -5.0A		25	40	nC
Gate-Source Charge	Q <sub>gs</sub>			5		
Gate-Drain Charge	Q <sub>gd</sub>			7		
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-25V, V <sub>GS</sub> =0V f=1MHz		1200	2000	pF
Output Capacitance	C <sub>oss</sub>			140		
Reverse Transfer Capacitance	C <sub>rss</sub>			90		
Turn-On Time	t <sub>d(on)</sub>	V <sub>DD</sub> =-30V, R <sub>L</sub> =3.0Ω I <sub>D</sub> ≡ -1A, V <sub>GEN</sub> =-10V R <sub>G</sub> =6Ω		10	20	ns
	t <sub>r</sub>			10	20	
Turn-Off Time	t <sub>d(off)</sub>			60	120	
	t <sub>f</sub>			30	60	



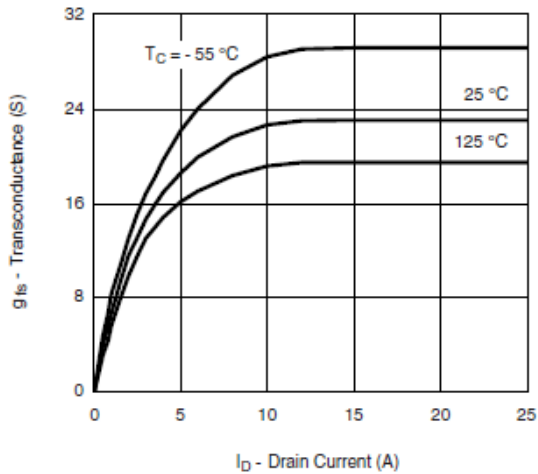
**Typical Characteristics ( N-Channel )**



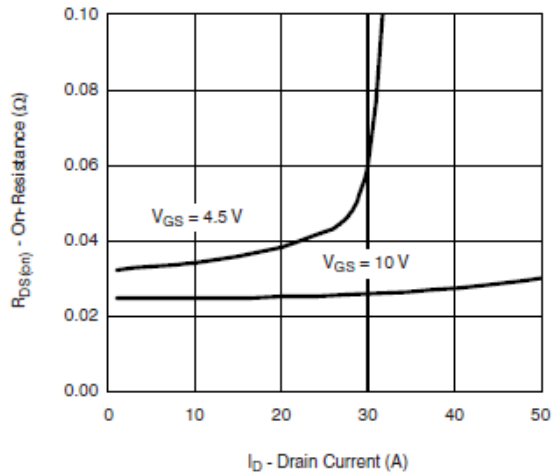
**Output Characteristics**



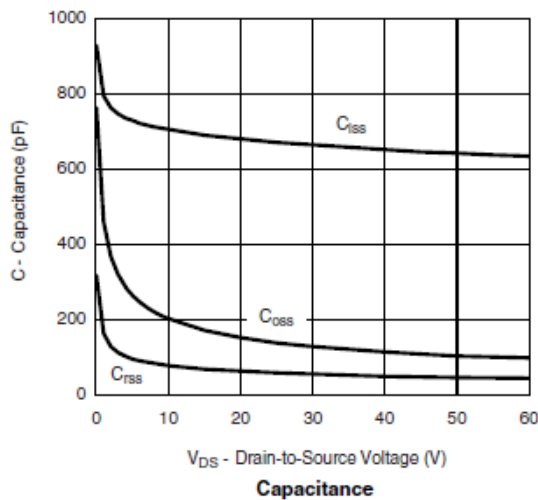
**Transfer Characteristics**



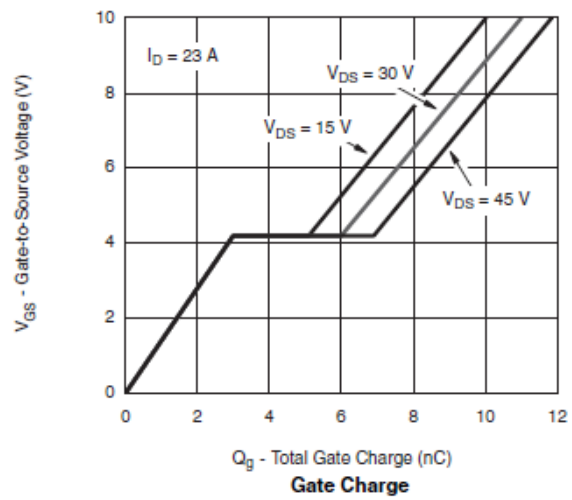
**Transconductance**



**On-Resistance vs. Drain Current**



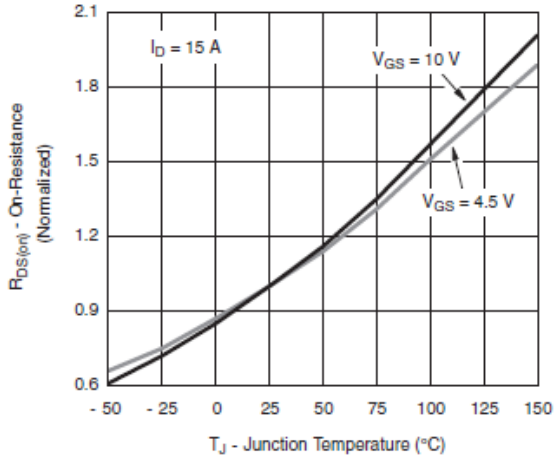
**Capacitance**



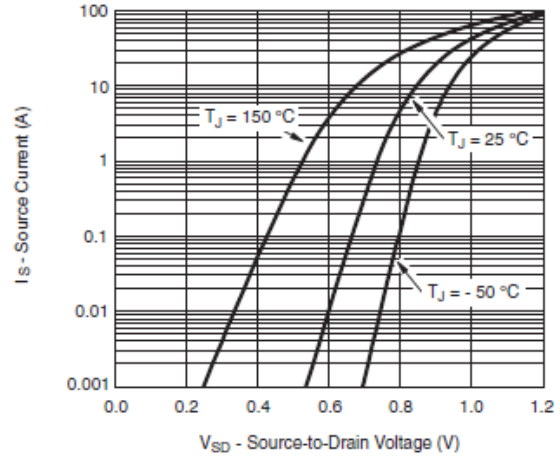
**Gate Charge**



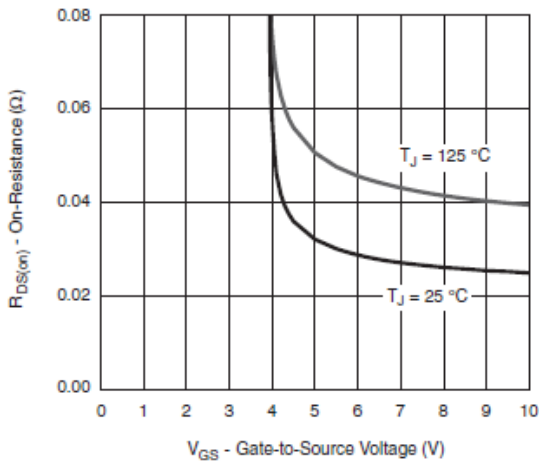
## Typical Characteristics ( N-Channel )



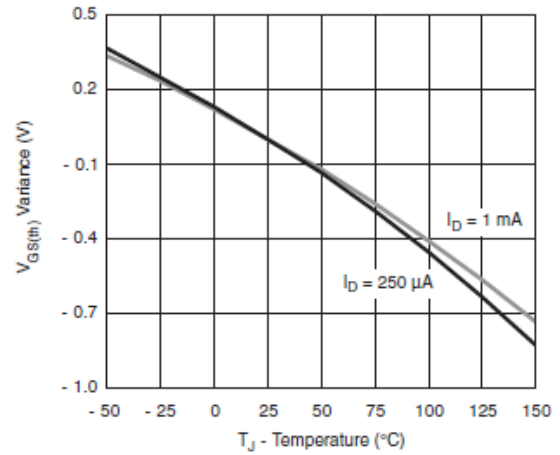
On-Resistance vs. Junction Temperature



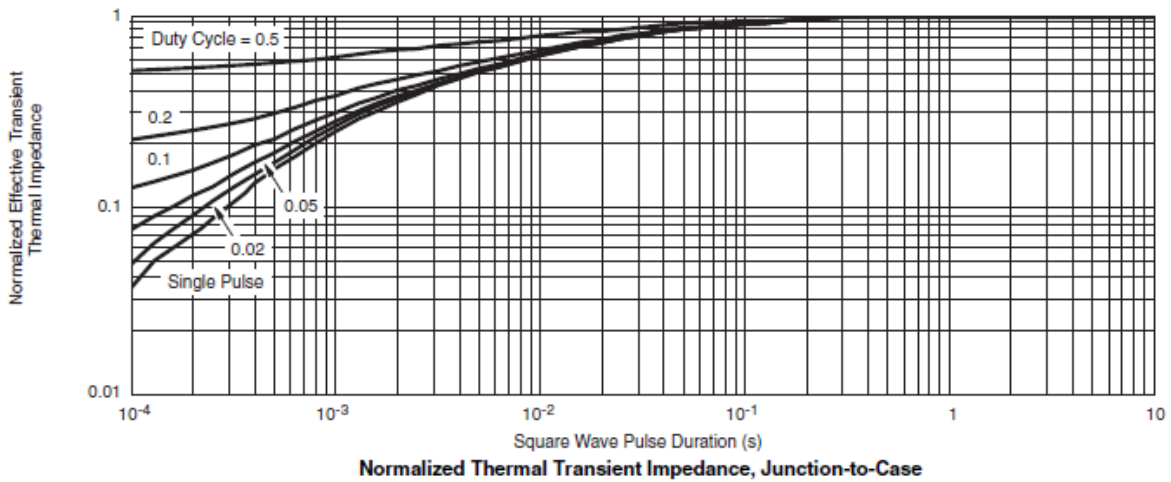
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



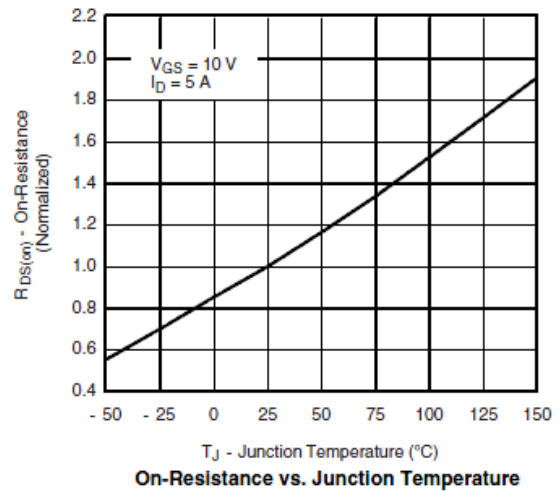
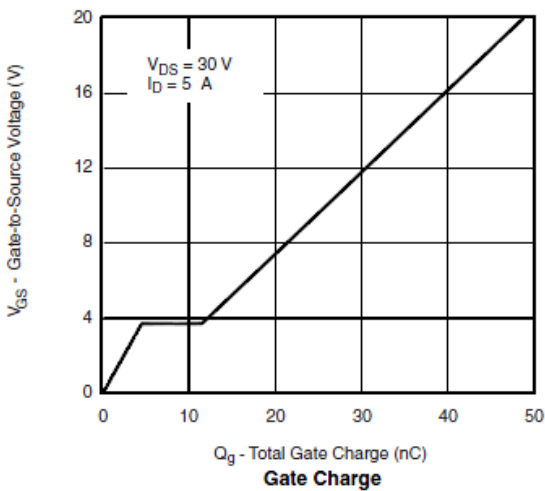
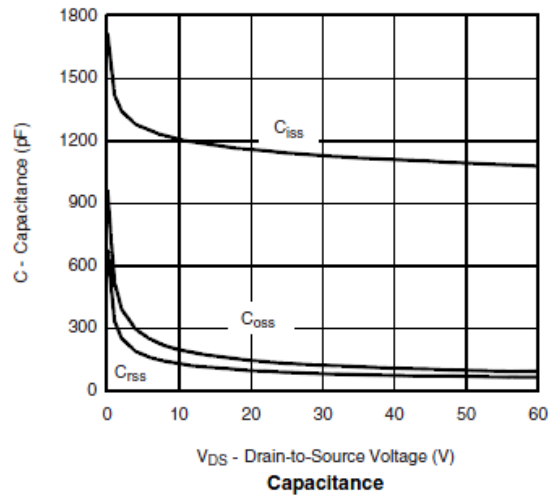
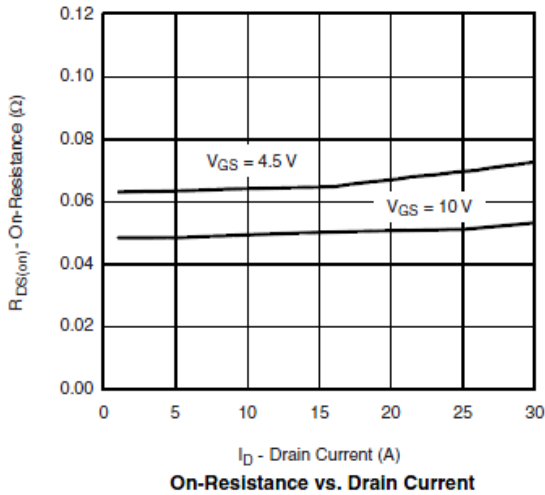
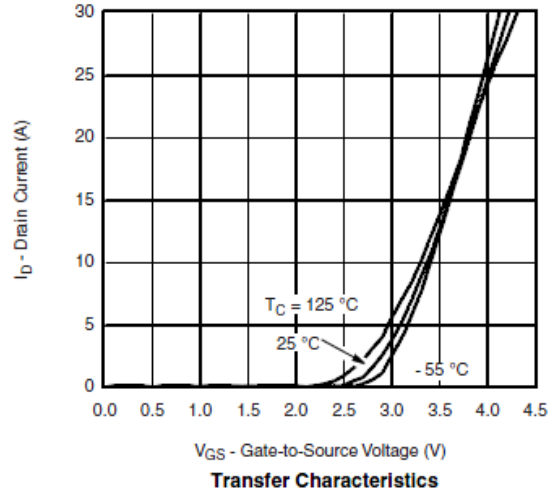
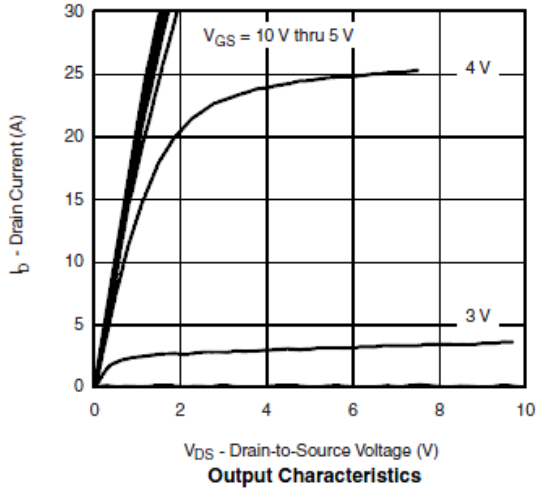
Threshold Voltage



Normalized Thermal Transient Impedance, Junction-to-Case

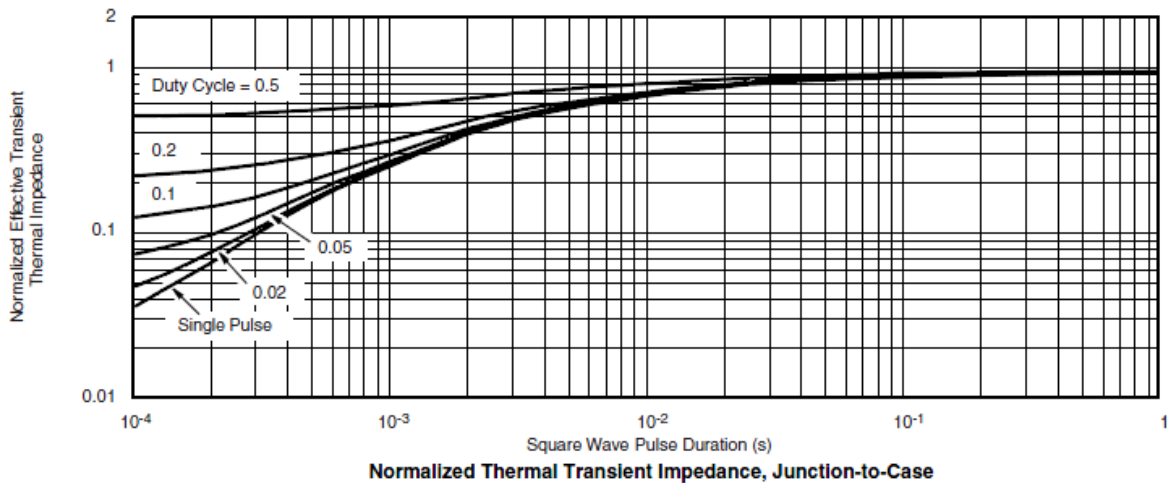
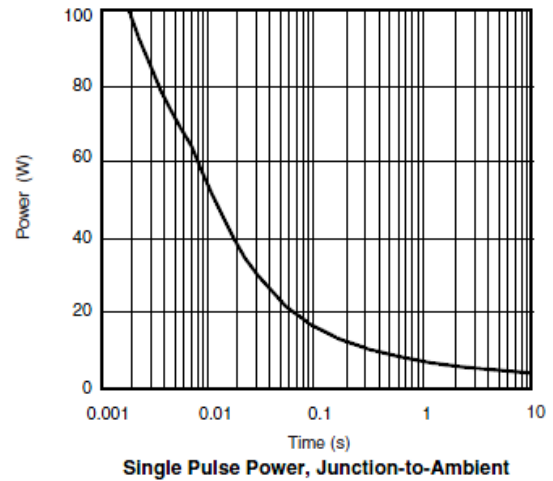
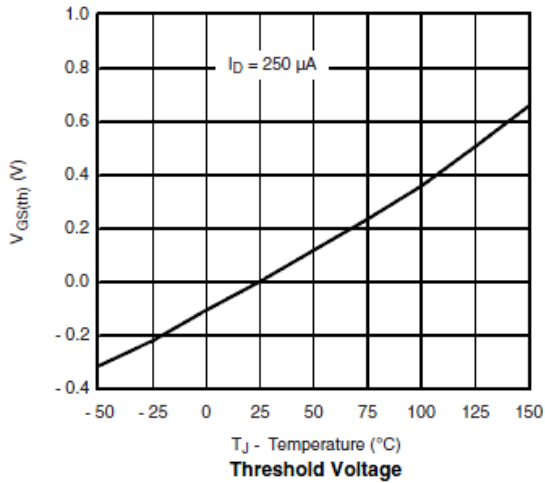
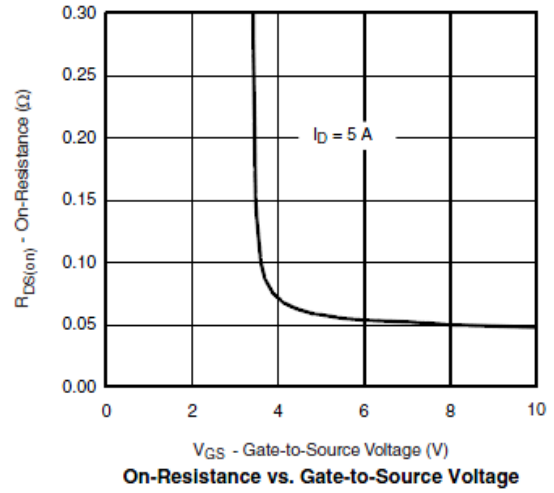
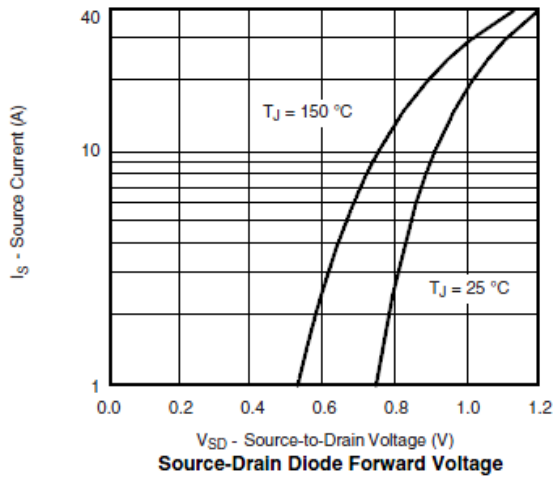


## Typical Characteristics ( P-Channel )





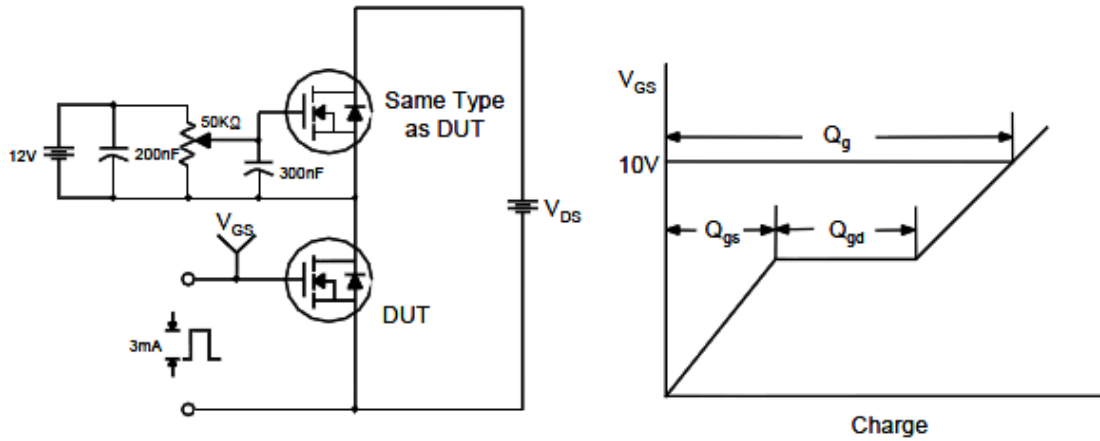
## Typical Characteristics ( P-Channel )



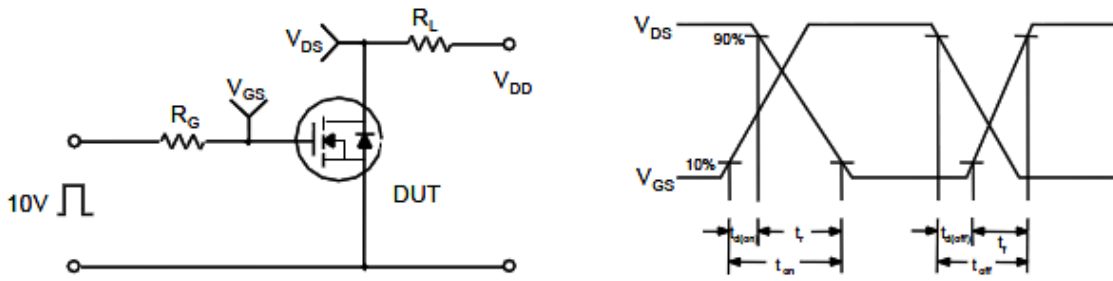


**Typical Characteristics**

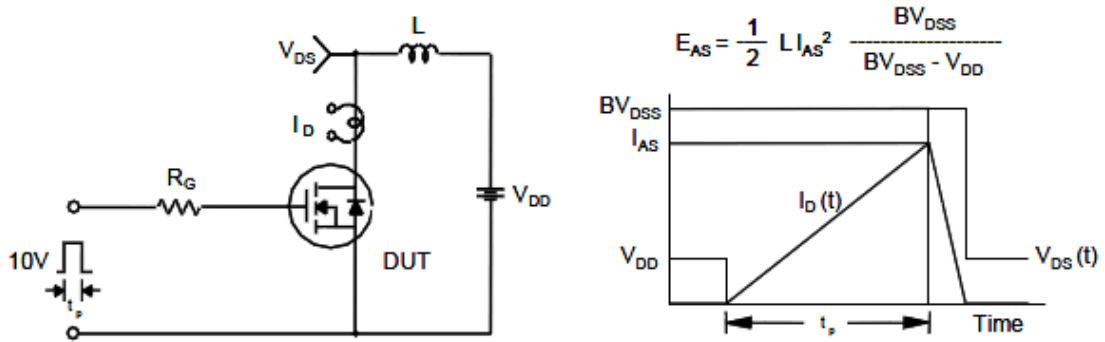
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



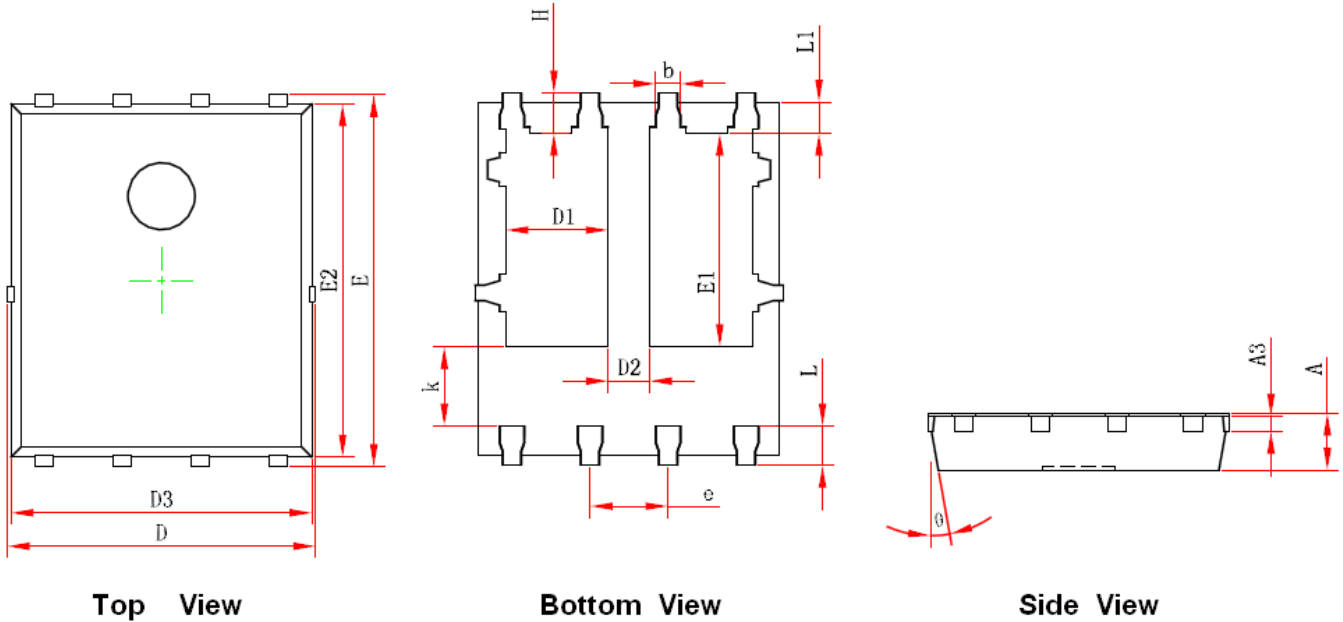
Unclamped Inductive Switching Test Circuit & Waveforms







**Package Information ( DFN 5X6-8L )**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254 REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	1.470	1.870	0.058	0.074
D2	0.470	0.870	0.019	0.034
E1	3.375	3.575	0.133	0.141
D3	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
$\theta$	10°	12°	10°	12°

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