



### General Description

AFC7420, 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, and low in-line power loss are needed in commercial industrial surface mount applications.

### Features

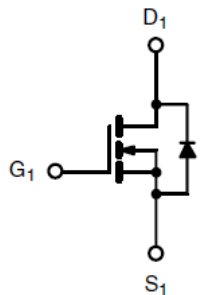
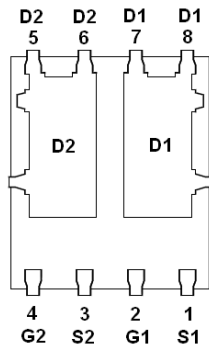
#### N-Channel

- 40V/15A,  $R_{DS(ON)}=8m\Omega@V_{GS}=10V$
- 40V/10A,  $R_{DS(ON)}=10m\Omega@V_{GS}=4.5V$

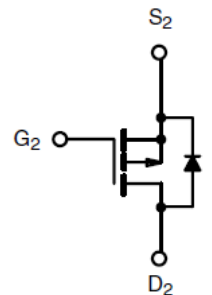
#### P-Channel

- -40V/-15A,  $R_{DS(ON)}=13m\Omega@V_{GS}=-10V$
- -40V/-10A,  $R_{DS(ON)}=16m\Omega@V_{GS}=-4.5V$

### Pin Description ( DFN5X6-8L )



N-Channel MOSFET



P-Channel MOSFET



TOP VIEW

### 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
AFC7420FN568RG	7420	DFN 5X6-8L	Tape & Reel	2500 EA

※ 7420 : Parts Code

※ YYMMDD : Date Code

※ AFC7420FN568RG : 13" Tape & Reel ; Pb- Free ; Halogen -Free



### Absolute Maximum Ratings ( N-Channel )

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

Parameter	Symbol	Typical	Unit
Drain-Source Voltage	V <sub>DSS</sub>	40	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	15
		T <sub>A</sub> =70°C	10
Pulsed Drain Current	I <sub>DM</sub>	40	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	40			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> =32V, V <sub>GS</sub> =0V			1	uA
		V <sub>DS</sub> =32V, 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> =10V	15			A
Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =15A		6	8	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A		7	10	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =15V, I <sub>D</sub> =10A		70		S
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =5A, V <sub>GS</sub> =0V		0.8	1.3	V
<b>Dynamic</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =20V, V <sub>GS</sub> =4.5V I <sub>D</sub> ≅10A		16	25	nC
Gate-Source Charge	Q <sub>gs</sub>		4.2			
Gate-Drain Charge	Q <sub>gd</sub>		5.6			
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V f=1MHz		1750		pF
Output Capacitance	C <sub>oss</sub>		260			
Reverse Transfer Capacitance	C <sub>rss</sub>		115			
Turn-On Time	t <sub>d(on)</sub>	V <sub>DD</sub> =20V, R <sub>L</sub> =2.0Ω I <sub>D</sub> ≅10A, V <sub>GEN</sub> =10V R <sub>G</sub> =1.0Ω		10	20	ns
	t <sub>r</sub>			10	20	
Turn-Off Time	t <sub>d(off)</sub>			20	40	
	t <sub>f</sub>			10	20	



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

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

Parameter	Symbol	Typical	Unit
Drain-Source Voltage	V <sub>DSS</sub>	-40	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	-15
		T <sub>A</sub> =85°C	-10
Pulsed Drain Current	I <sub>DM</sub>	-40	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

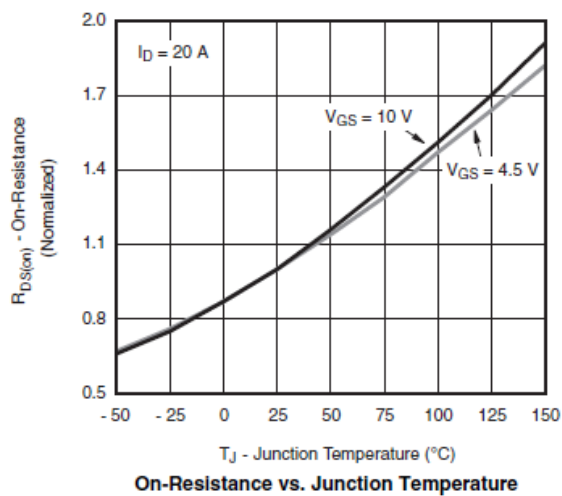
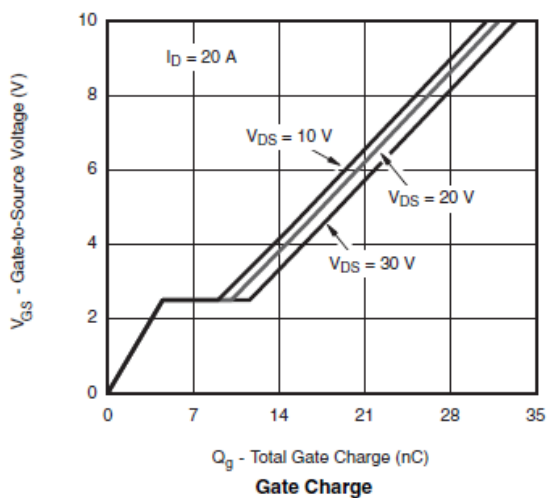
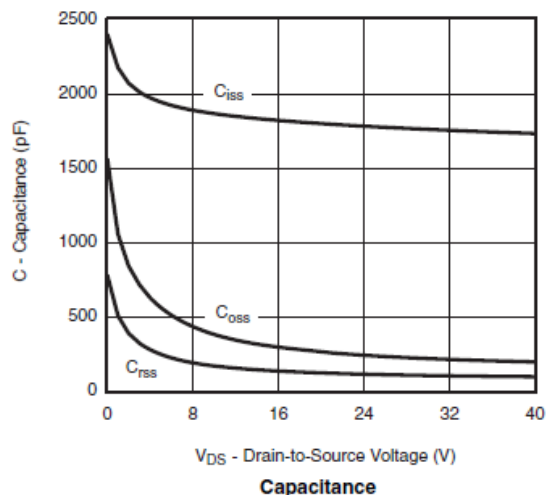
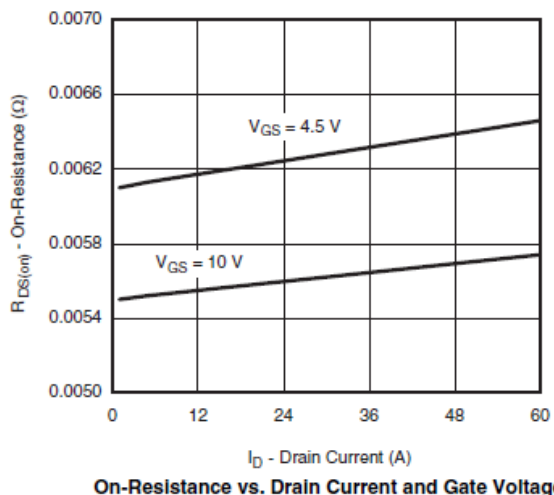
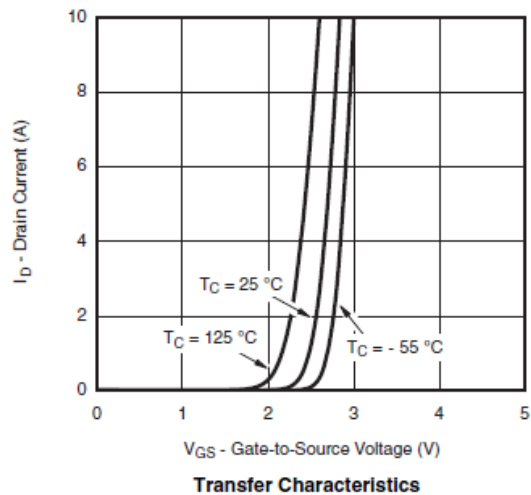
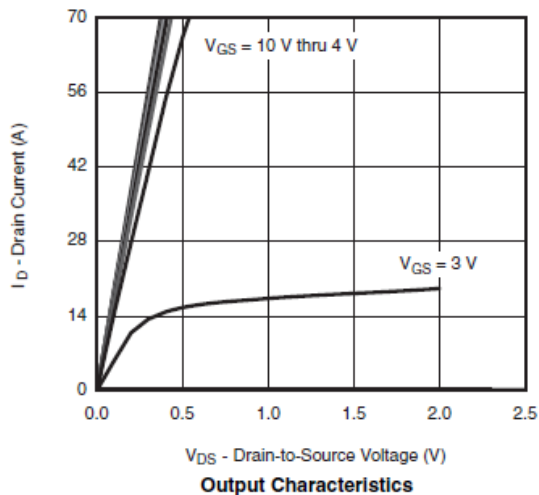
**Electrical Characteristics ( P-Channel )**

(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	-40			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> = -32V, V <sub>GS</sub> =0V			-1	
		V <sub>DS</sub> = -32V, V <sub>GS</sub> =0V T <sub>J</sub> =85°C			-20	uA
On-State Drain Current	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ -10V, V <sub>GS</sub> = -10V	-15			A
Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = -10V, I <sub>D</sub> = -15A		10	13	
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -10A		13	16	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = -10V, I <sub>D</sub> = -15A		40		S
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = -1A, V <sub>GS</sub> =0V		-0.8	-1.3	V
<b>Dynamic</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-20V, V <sub>GS</sub> =-4.5V I <sub>D</sub> = -10A		45	90	nC
Gate-Source Charge	Q <sub>gs</sub>			10		
Gate-Drain Charge	Q <sub>gd</sub>			20		
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V f=1MHz		4150		pF
Output Capacitance	C <sub>oss</sub>			435		
Reverse Transfer Capacitance	C <sub>rss</sub>			400		
Turn-On Time	t <sub>d(on)</sub>	V <sub>DD</sub> =-20V, R <sub>L</sub> =2Ω I <sub>D</sub> =-10A, V <sub>GEN</sub> =-10V R <sub>G</sub> =1Ω		15	30	ns
	t <sub>r</sub>			15	30	
Turn-Off Time	t <sub>d(off)</sub>			55	110	
	t <sub>f</sub>			12	25	

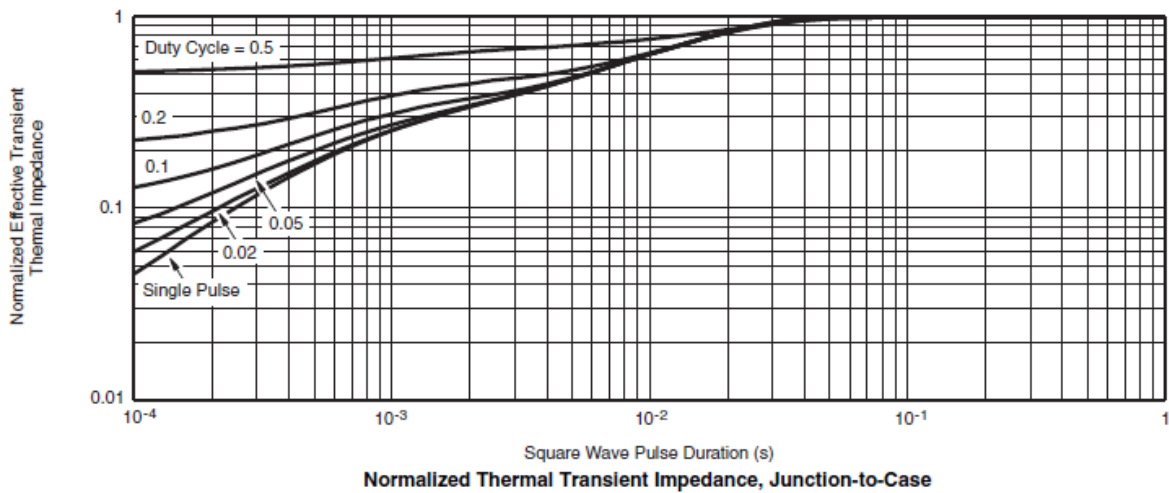
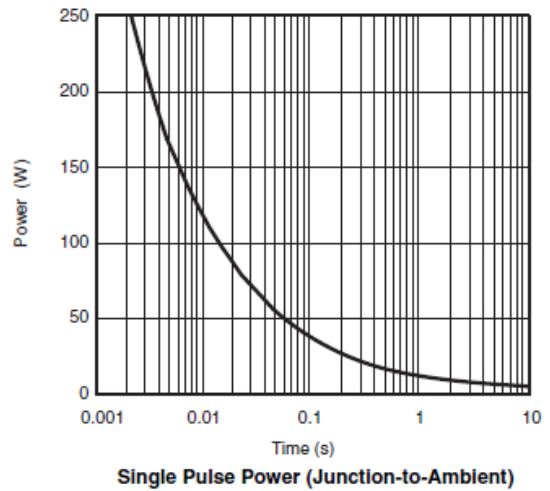
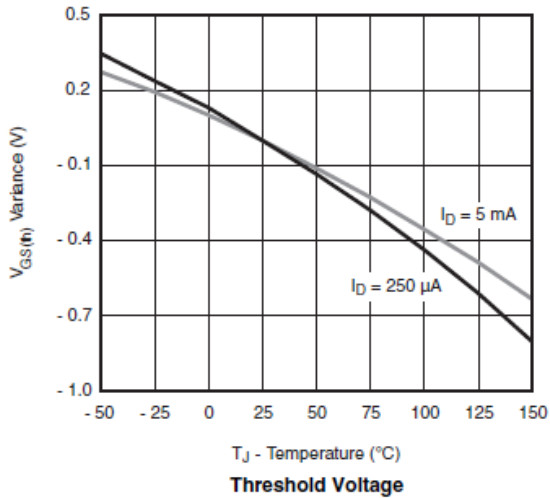
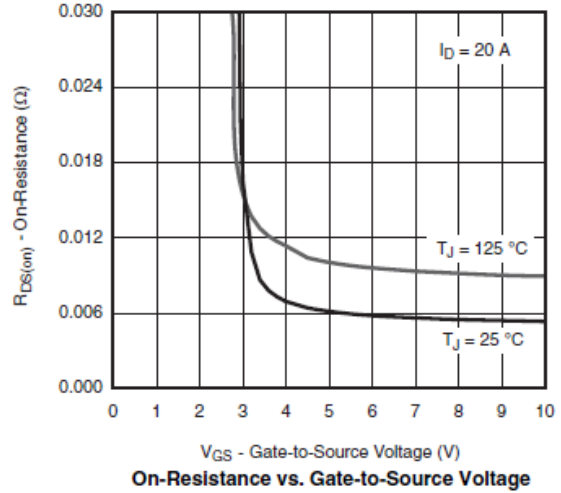
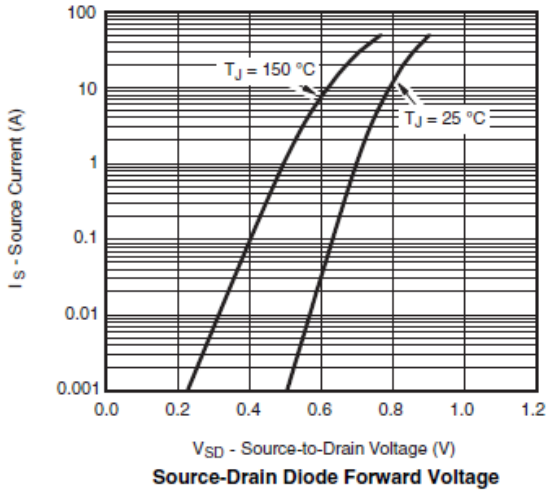


## Typical Characteristics ( N-Channel )



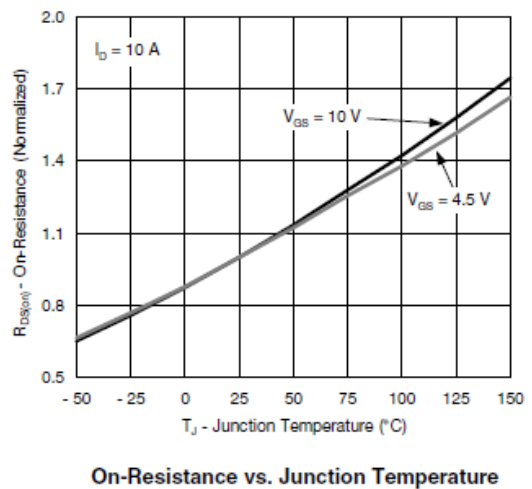
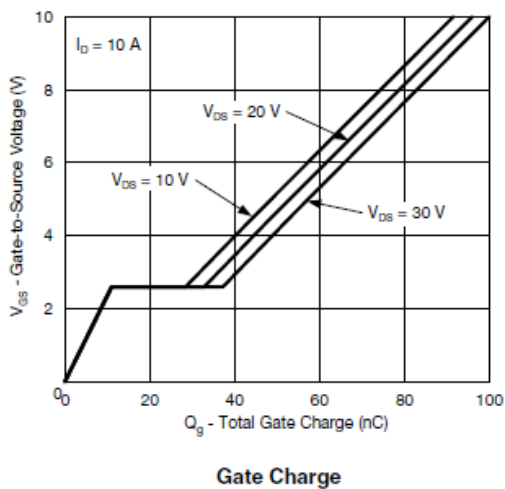
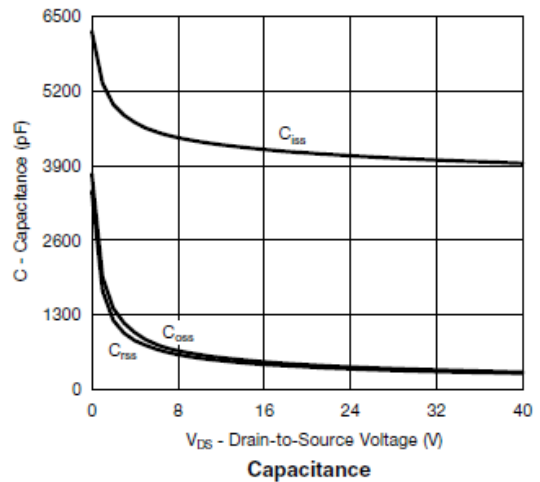
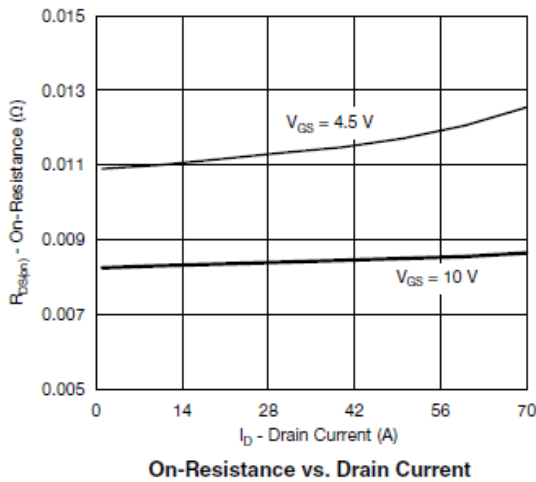
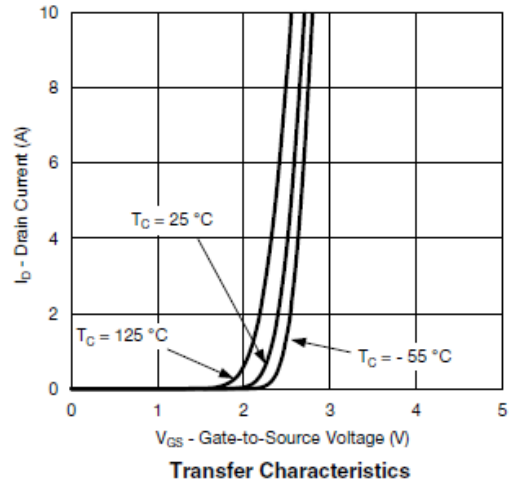
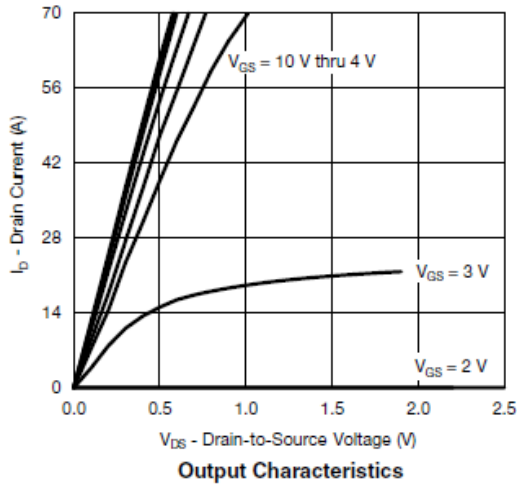


## Typical Characteristics ( N-Channel )



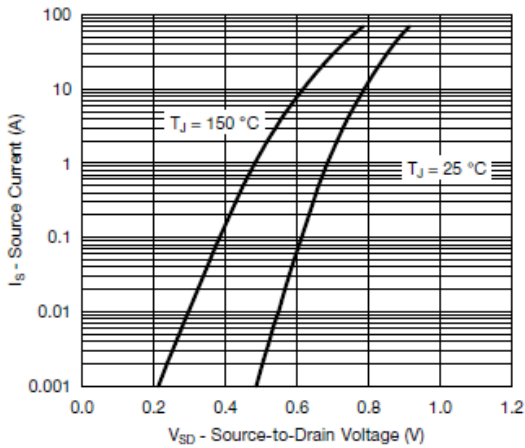


## Typical Characteristics ( P-Channel )

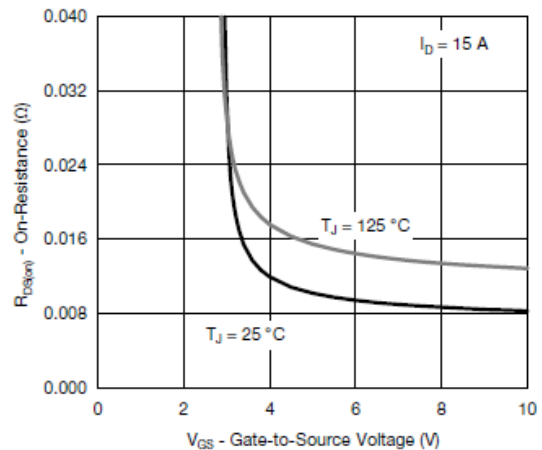




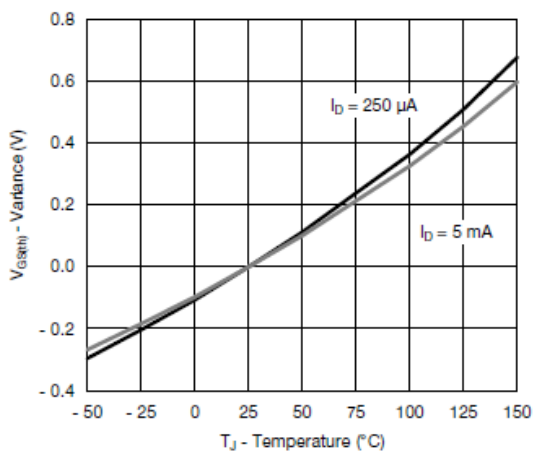
## Typical Characteristics ( P-Channel )



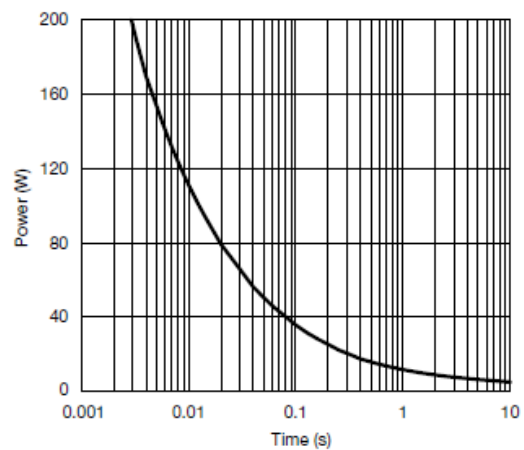
Source-Drain Diode Forward Voltage



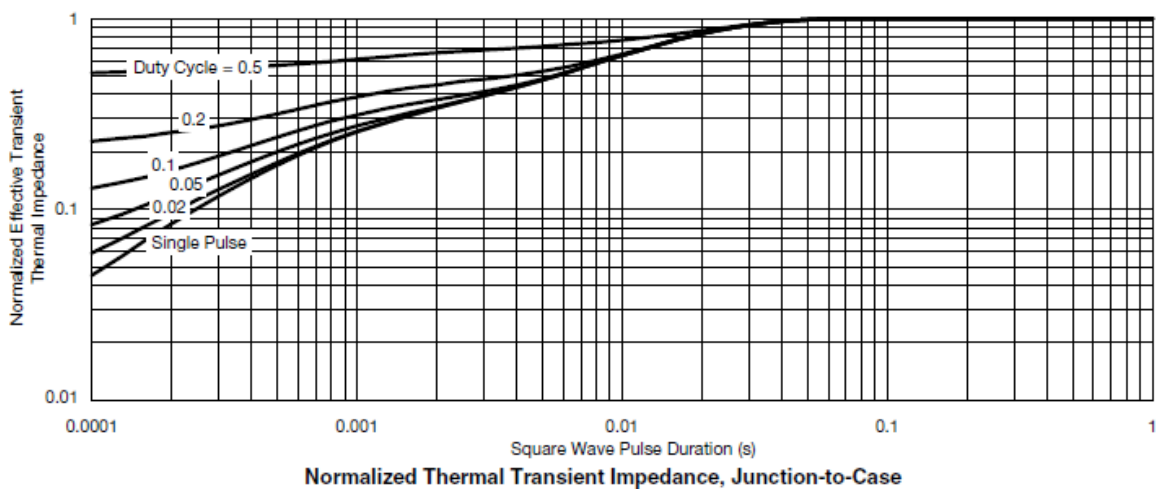
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power, Junction-to-Ambient

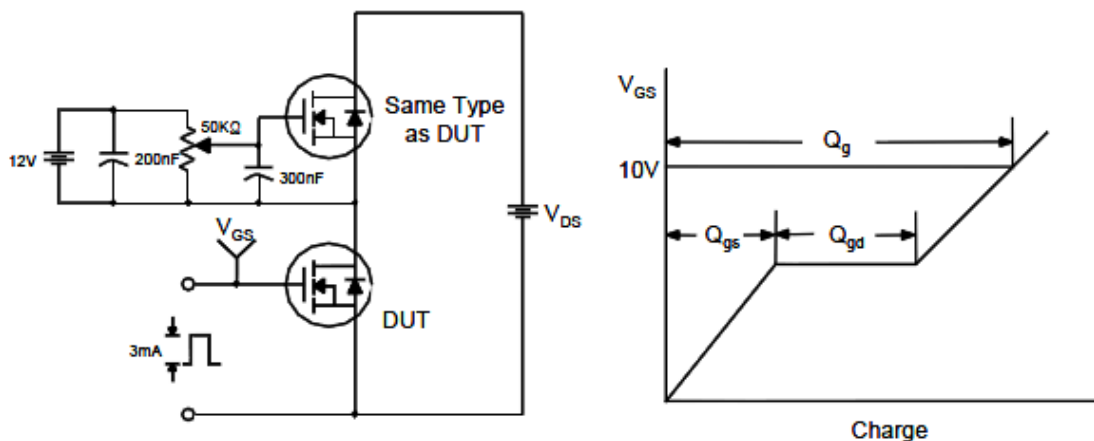


Normalized Thermal Transient Impedance, Junction-to-Case

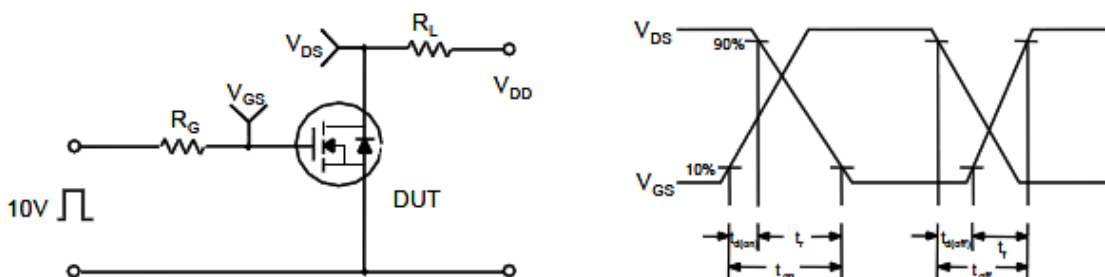


**Typical Characteristics**

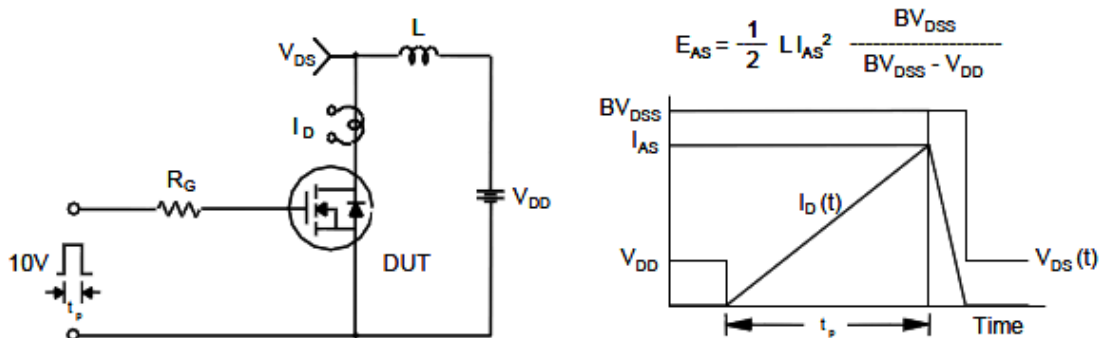
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



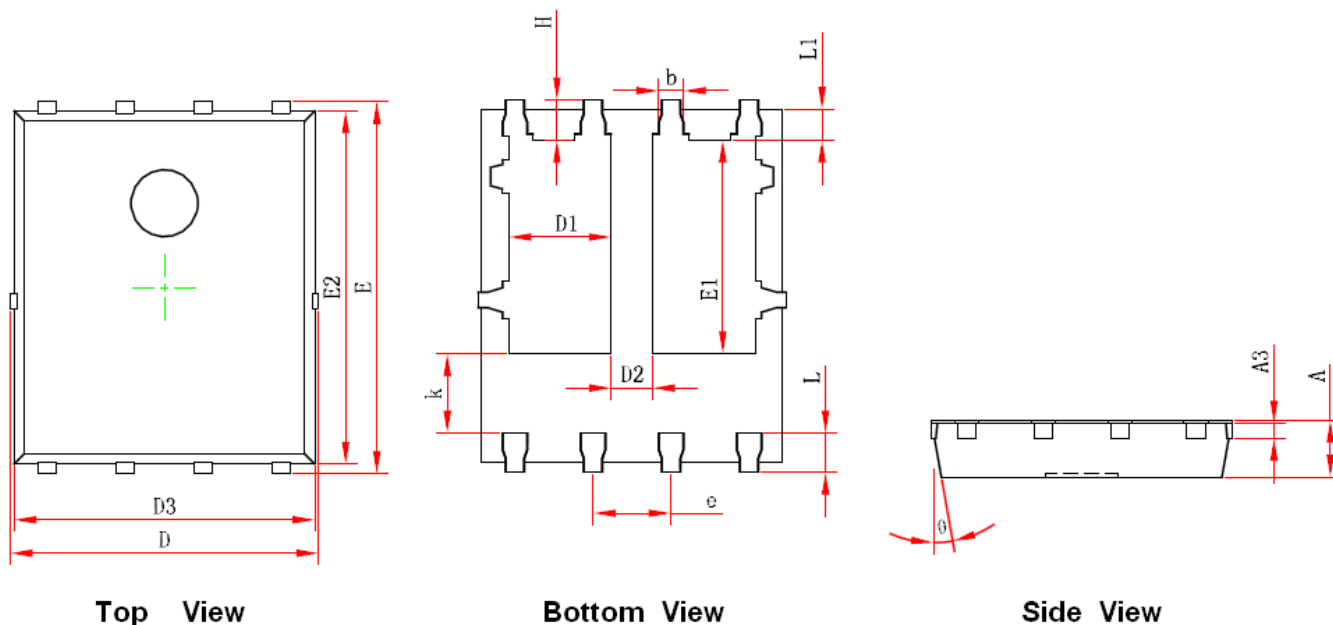
Unclamped Inductive Switching Test Circuit & Waveforms







**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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 2F, No.80, Sec.1, Cheng Kung Rd., Nan Kang Dist., Taipei City 115, Taiwan (R.O.C.)  
 Tel : 886 2) 2651 3928  
 Fax : 886 2) 2786 8483  
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