



General Description

AFC7640, 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

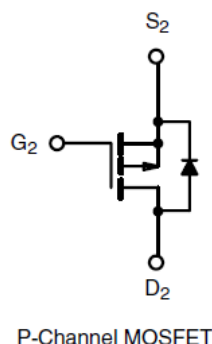
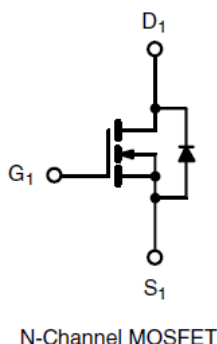
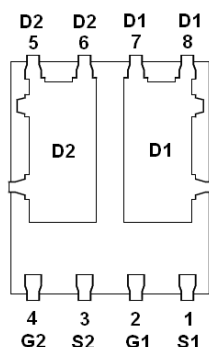
N-Channel

- 60V/ 7A, $R_{DS(ON)}=30m\Omega@V_{GS}=10V$
- 60V/ 6A, $R_{DS(ON)}=35m\Omega@V_{GS}=4.5V$

P-Channel

- -60V/-5.0A, $R_{DS(ON)}= 50m\Omega@V_{GS}= -10V$
- -60V/-4.5A, $R_{DS(ON)}= 60m\Omega@V_{GS}= -4.5V$

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_A=25°C Unless otherwise noted)

Parameter	Symbol	Typical	Unit
Drain-Source Voltage	V _{DSS}	60	V
Gate –Source Voltage	V _{GSS}	±20	V
Continuous Drain Current(T _J =150°C)	I _D	7	A
		6	
Pulsed Drain Current	I _{DM}	30	A
Continuous Source Current(Diode Conduction)	I _S	2.9	A
Power Dissipation	P _D	3.5	W
		2.2	
Operating Junction Temperature	T _J	150	°C
Storage Temperature Range	T _{STG}	-55/150	°C
Thermal Resistance-Junction to Ambient	R _{θJA}	62.5	°C/W

Electrical Characteristics (N-Channel)

(T_A=25°C Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =250uA	60			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250uA	1.0		2.5	
Gate Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =60V, V _{GS} =0V			1	uA
		V _{DS} =60V, V _{GS} =0V T _J =85°C			5	
On-State Drain Current	I _{D(on)}	V _{DS} ≥5V, V _{GS} =4.5V	30			A
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =10V, I _D =7.0A		25	30	mΩ
		V _{GS} =4.5V, I _D =6.0A		28	35	
Forward Transconductance	g _{FS}	V _{DS} =15V, I _D =5.3A		24		S
Diode Forward Voltage	V _{SD}	I _S =3.0A, V _{GS} =0V		0.8	1.3	V
Dynamic						
Total Gate Charge	Q _g	V _{DS} =30V, V _{GS} =4.5V I _D =23A		7	15	nC
Gate-Source Charge	Q _{gs}			3.2		
Gate-Drain Charge	Q _{gd}			3.2		
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V f=1MHz		700		pF
Output Capacitance	C _{oss}			150		
Reverse Transfer Capacitance	C _{rss}			70		
Turn-On Time	t _{d(on)}	V _{DD} =30V, R _L =1.3Ω I _D =23A, V _{GEN} =10V R _G =1Ω		10	20	ns
	t _r			15	30	
Turn-Off Time	t _{d(off)}			30	65	
	t _f			25	50	



Absolute Maximum Ratings (P-Channel)

(T_A=25°C Unless otherwise noted)

Parameter	Symbol	Typical	Unit
Drain-Source Voltage	V _{DSS}	-60	V
Gate –Source Voltage	V _{GSS}	±20	V
Continuous Drain Current(T _J =150°C)	I _D	T _A =25°C -7.0	A
		T _A =85°C -6.0	
Pulsed Drain Current	I _{DM}	-30	A
Continuous Source Current(Diode Conduction)	I _S	-2.9	A
Power Dissipation	P _D	T _A =25°C 3.5	W
		T _A =70°C 2.2	
Operating Junction Temperature	T _J	150	°C
Storage Temperature Range	T _{STG}	-55/150	°C
Thermal Resistance-Junction to Ambient	R _{θJA}	62.5	°C/W

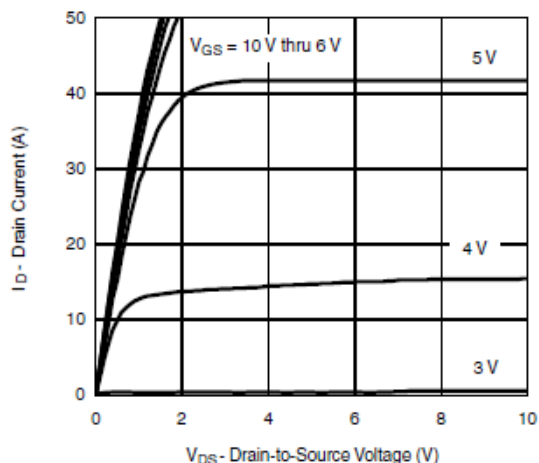
Electrical Characteristics (P-Channel)

(T_A=25°C Unless otherwise noted)

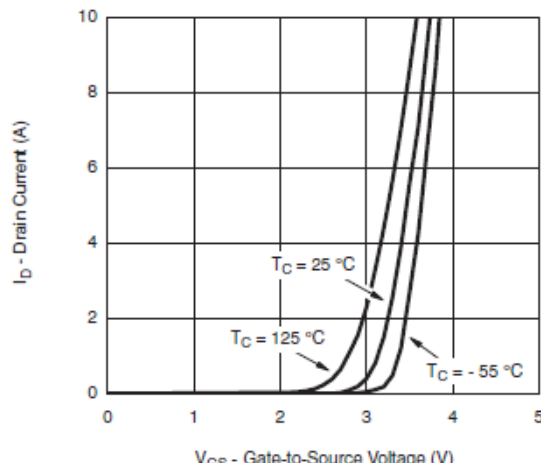
Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} =0V, I _D = -250uA	-60			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D = -250uA	-1.0		-2.5	
Gate Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} = ±16V			±100	nA
Zero Gate Voltage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



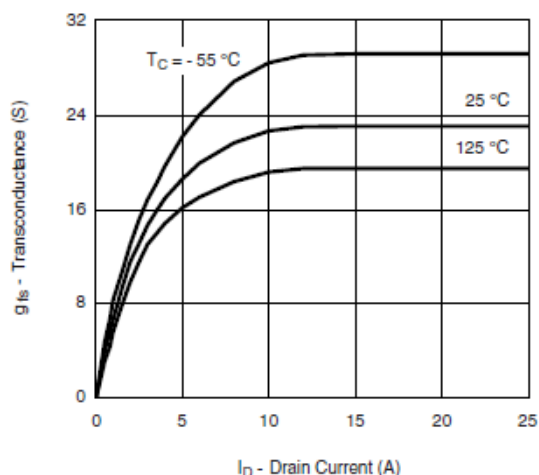
Typical Characteristics (N-Channel)



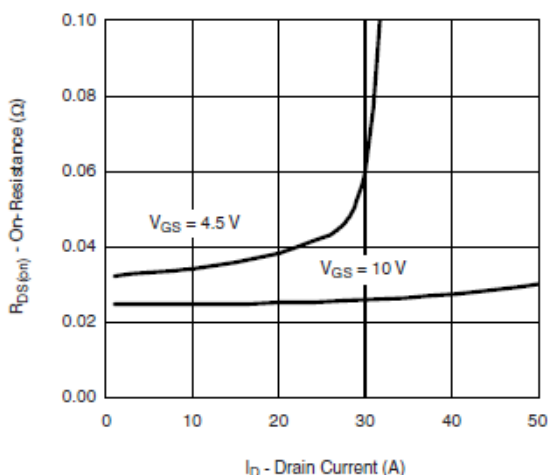
Output Characteristics



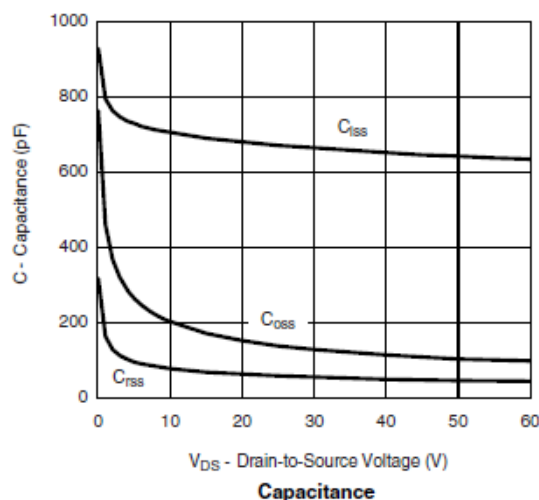
Transfer Characteristics



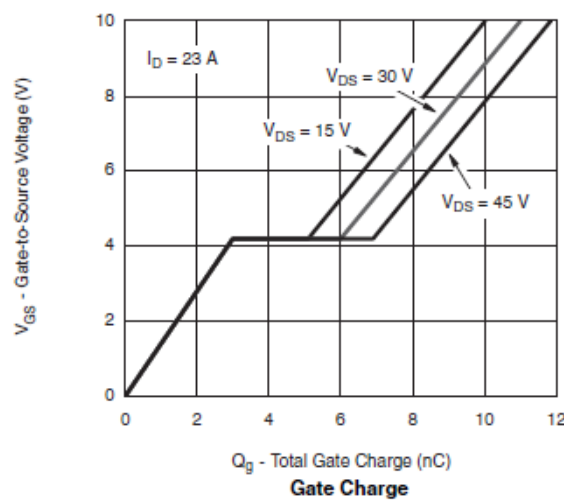
Transconductance



On-Resistance vs. Drain Current

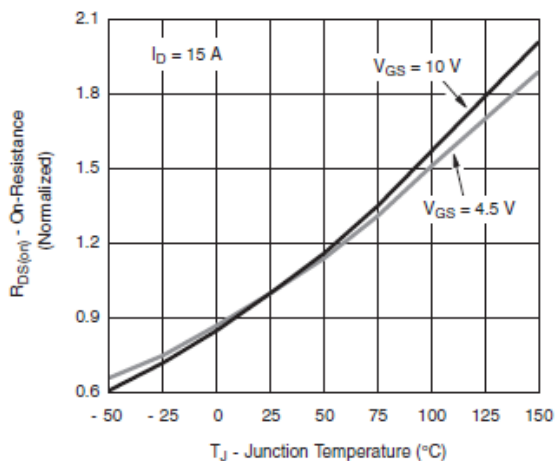


Capacitance

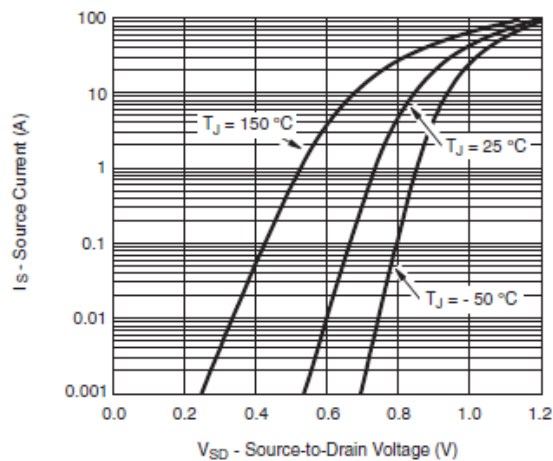




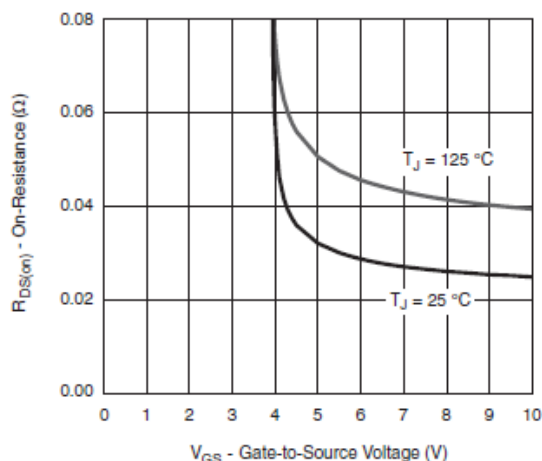
Typical Characteristics (N-Channel)



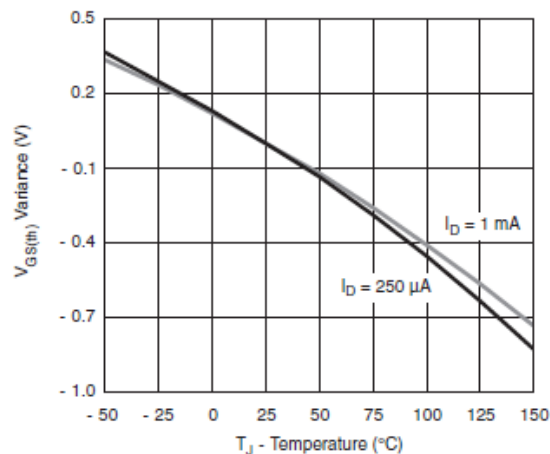
On-Resistance vs. Junction Temperature



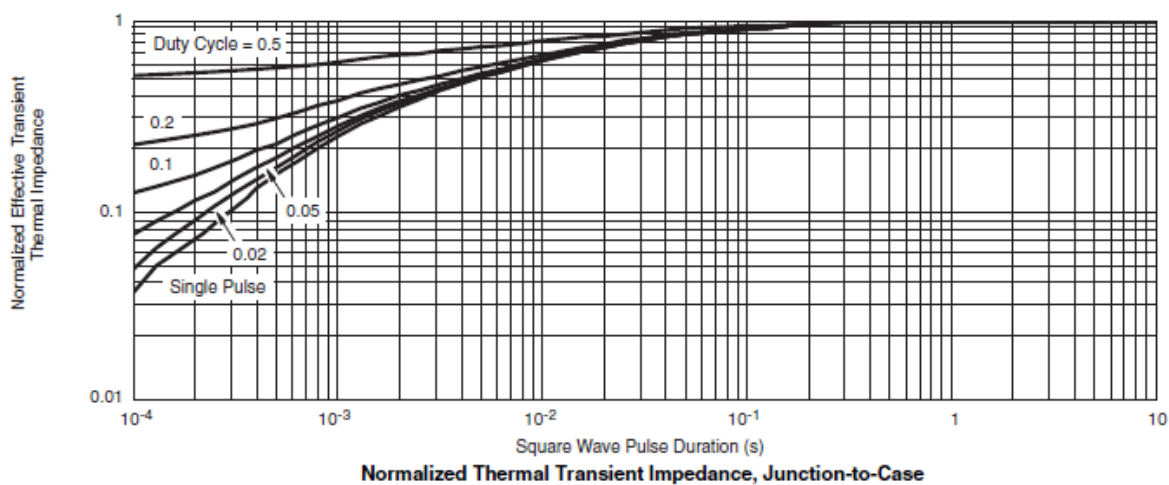
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



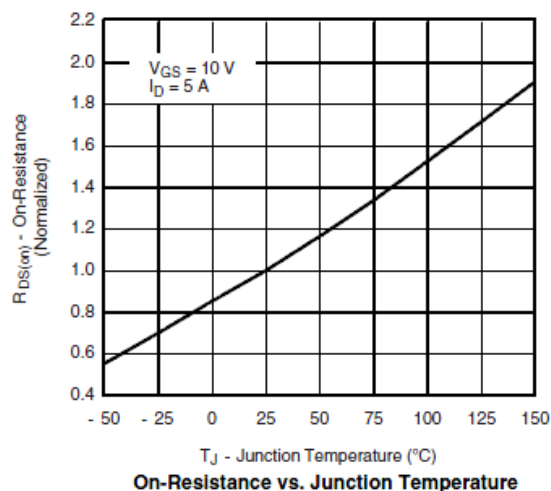
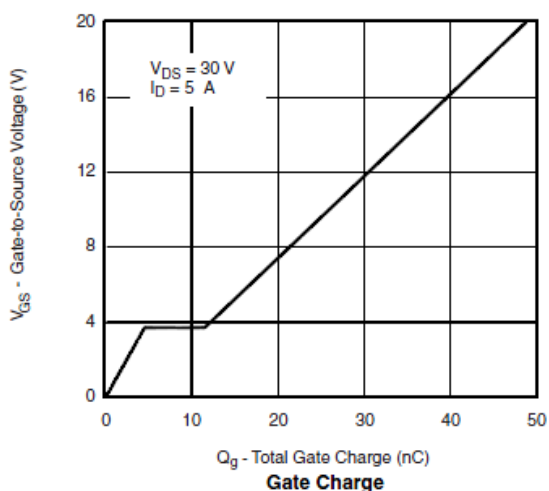
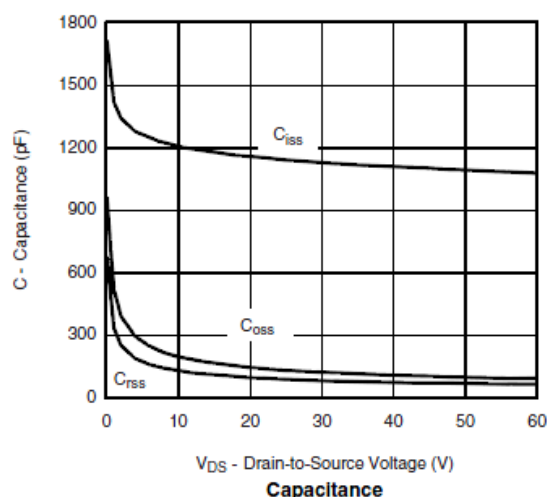
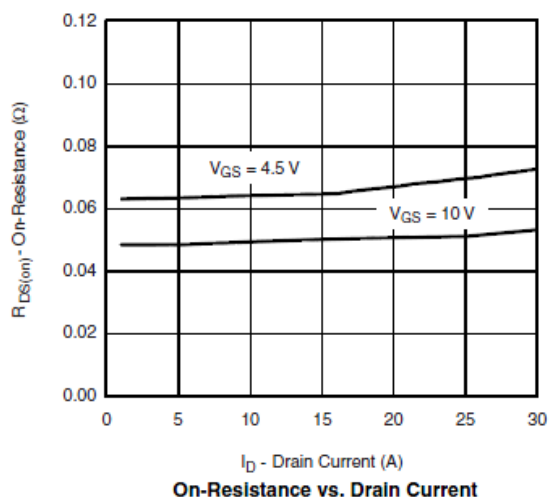
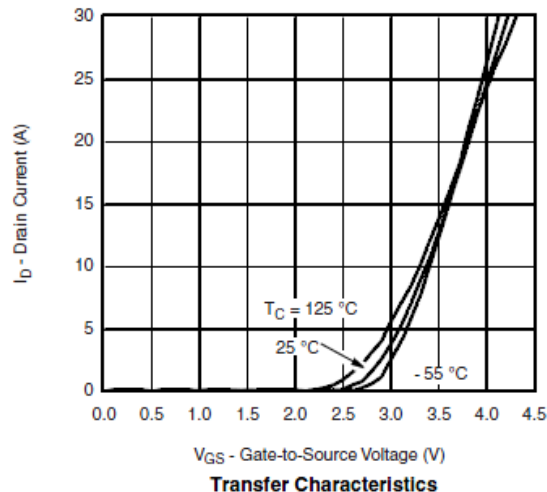
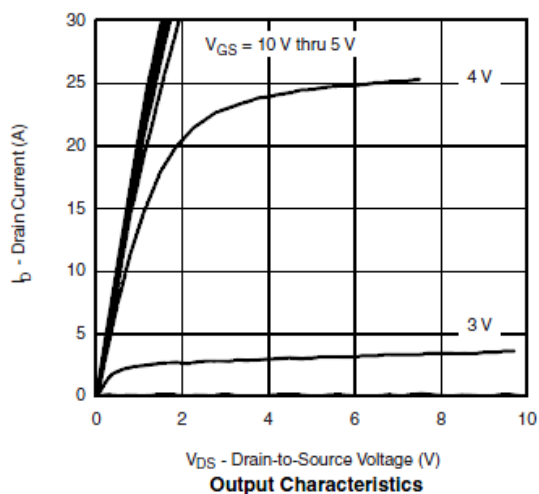
Threshold Voltage



Normalized Thermal Transient Impedance, Junction-to-Case

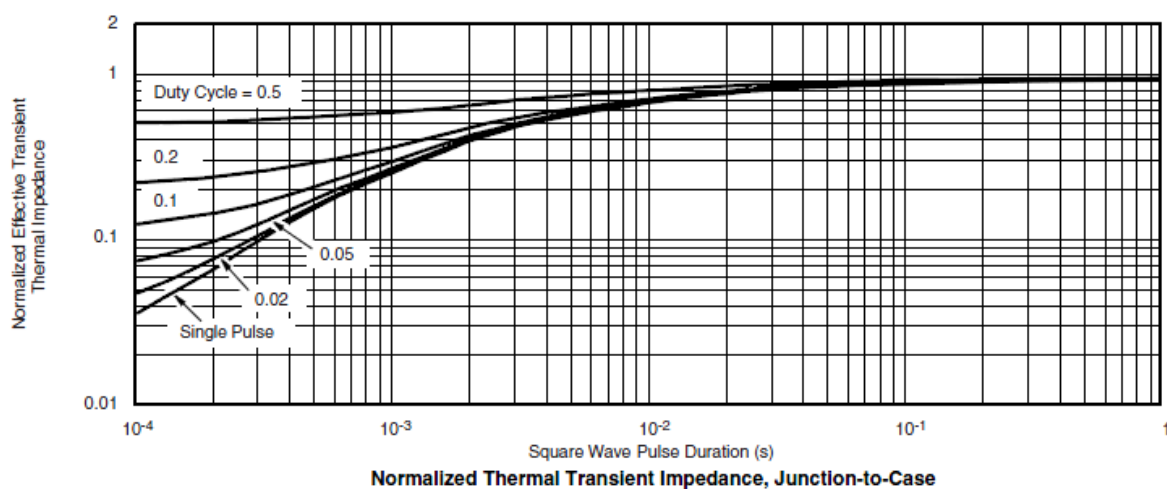
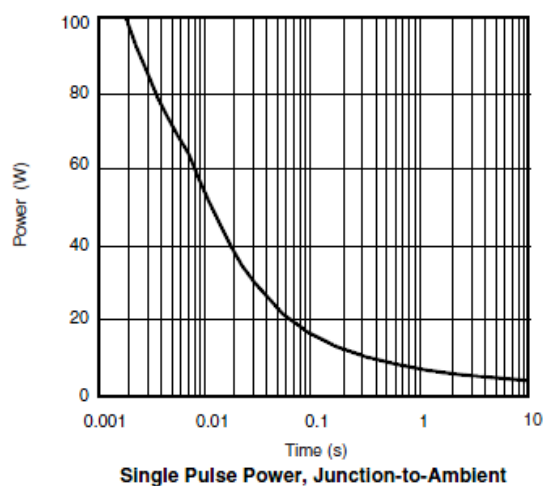
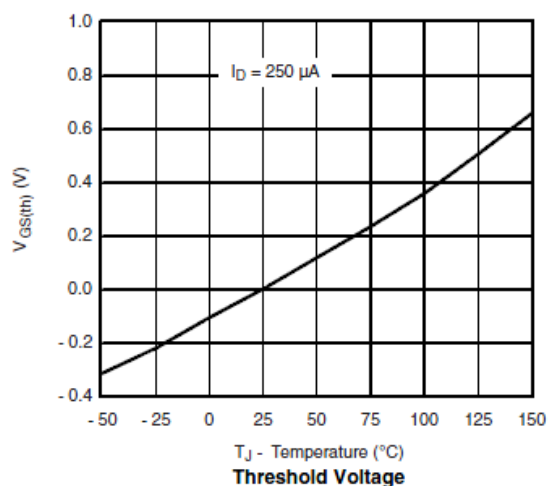
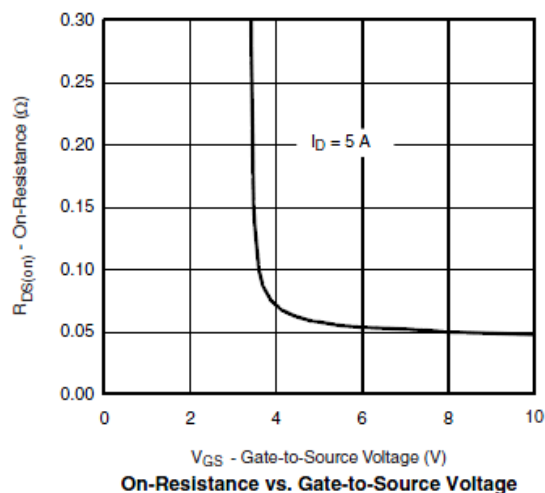
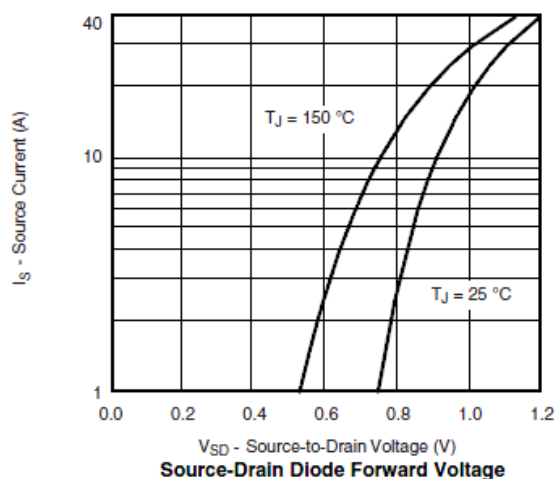


Typical Characteristics (P-Channel)





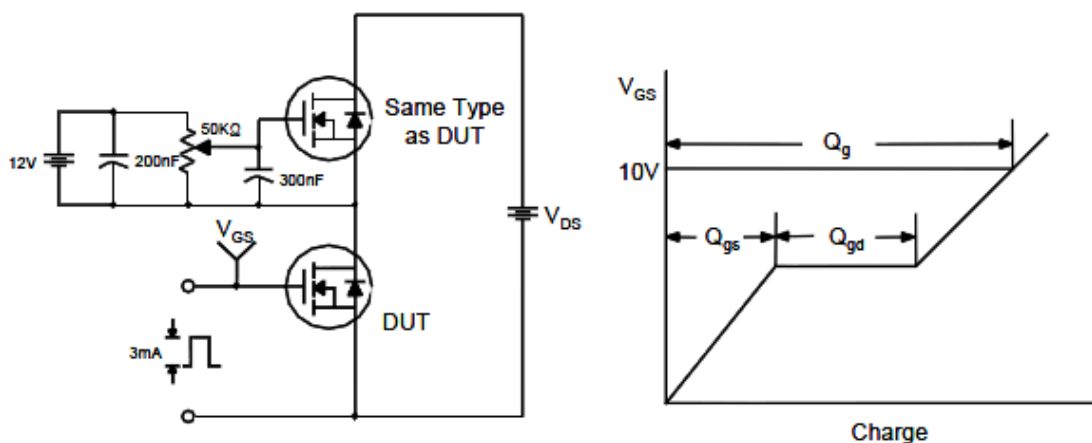
Typical Characteristics (P-Channel)



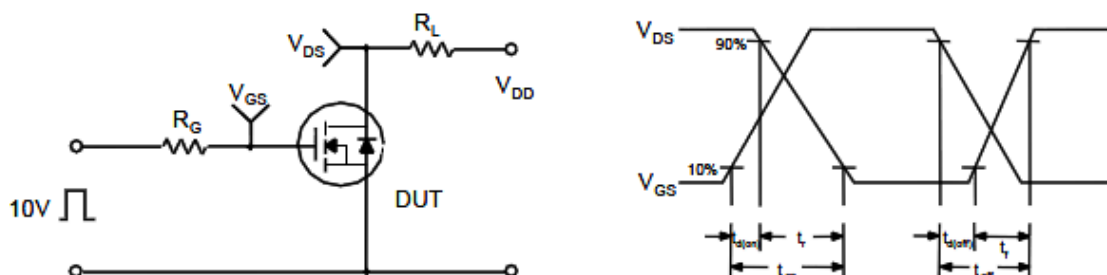


Typical Characteristics

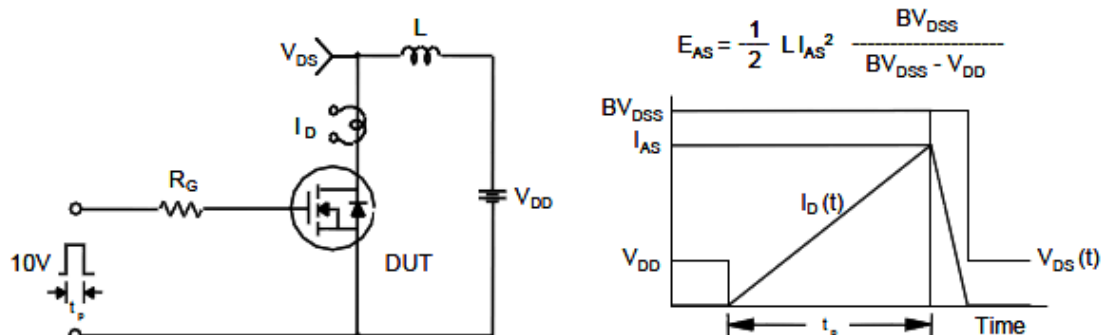
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

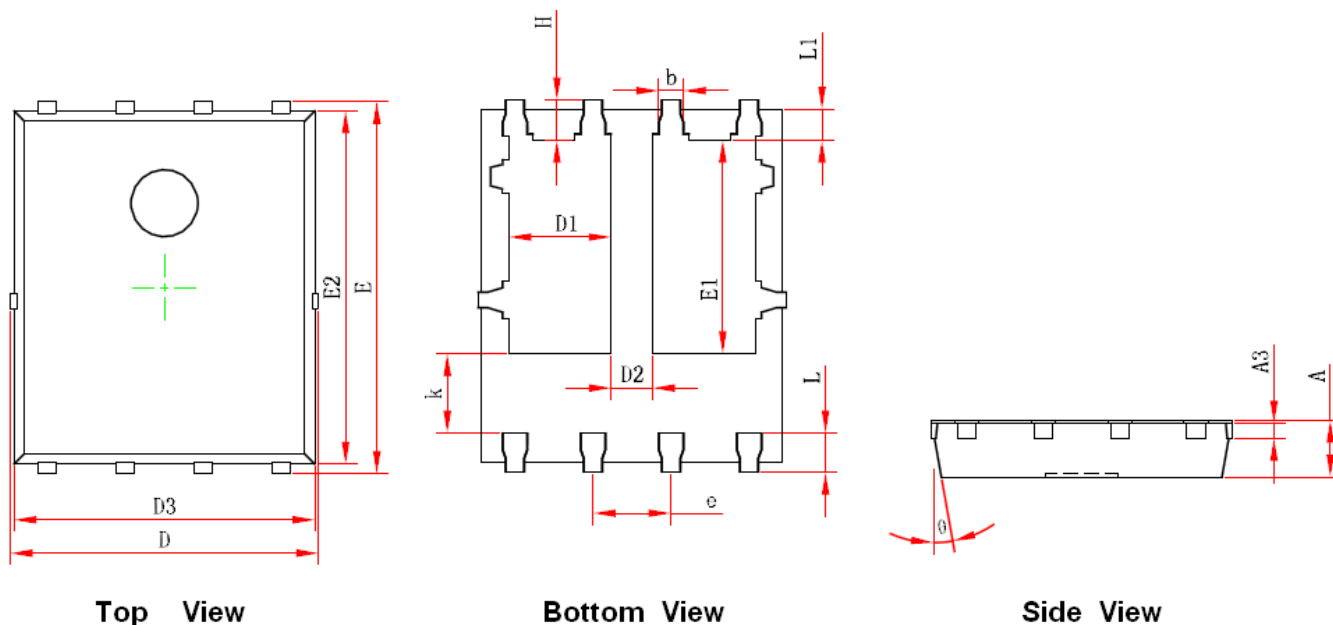


Unclamped Inductive Switching Test Circuit & Waveforms





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.		0.010 REF.	
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	1.270 TYP.		0.050 TYP.	
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
θ	10°	12°	10°	12°

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