Alfa-MOS Technology

AFC7540
20V N & P Pair Enhancement Mode MOSFET

General Description

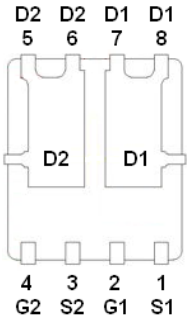
AFC7540, N & P Pair enhancement mode MOSFET, uses Advanced Trench Technology to provide excellent RDS(ON), low gate charge.
These devices are particularly suited for low voltage power management, and low in-line power loss are needed in commercial industrial surface mount applications.

Features

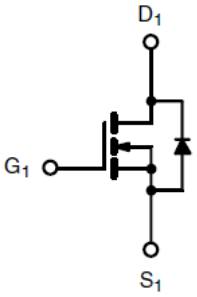
N-Channel
- 20V/ 12A,$R_{DS(ON)}$=14mΩ@V_{GS}=4.5V
- 20V/ 10A,$R_{DS(ON)}$=16mΩ@V_{GS}=2.5V
- 20V/ 8A,$R_{DS(ON)}$=20mΩ@V_{GS}=1.8V

P-Channel
- -20V/-9A,$R_{DS(ON)}$=33mΩ@V_{GS}=-4.5V
- -20V/-8A,$R_{DS(ON)}$=42mΩ@V_{GS}=-2.5V
- -20V/-6A,$R_{DS(ON)}$=68mΩ@V_{GS}=-1.8V

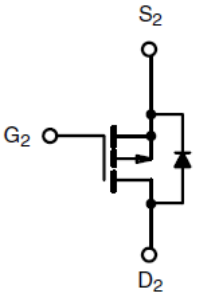
Pin Description (DFN5X6-8L)



BOTTOM VIEW



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
AFC7540FN568RG	7540	DFN 5X6-8L	Tape & Reel	2500 EA

※ 7540 : Parts Code
※ YYMMDD : Date Code
※ AFC7540FN568RG : 13”Tape & Reel ; Pb- Free ; Halogen –Free

Absolute Maximum Ratings (N-Channel)

(T_A=25℃ Unless otherwise noted)

Parameter		Symbol	Typical	Unit
Drain-Source Voltage		V_{DSS}	20	V
Gate –Source Voltage		V_{GSS}	±12	V
Continuous Drain Current(T_J=150℃)	T_A=25℃	I_D	12	A
	T_A=70℃		10	
Pulsed Drain Current		I_{DM}	20	A
Continuous Source Current(Diode Conduction)		I_S	1.5	A
Power Dissipation	T_A=25℃	P_D	3.5	W
	T_A=70℃		2.2	
Operating Junction Temperature		T_J	150	℃
Storage Temperature Range		T_{STG}	-55/150	℃
Thermal Resistance-Junction to Ambient		$R_{\theta JA}$	62.5	℃/W

Electrical Characteristics (N-Channel)

(T_A=25℃ Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V,I_D=250uA	20			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250uA	0.35		1.0	
Gate Leakage Current	I_{GSS}	V_{DS}=0V,V_{GS}=±12V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=20V,V_{GS}=0V			1	uA
		V_{DS}=20V,V_{GS}=0V T_J=85℃			10	
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}=4.5V,I_D=12A		8.4	14	mΩ
		V_{GS}=2.5V,I_D=10A		9.6	16	
		V_{GS}=1.8V,I_D= 8A		12	20	
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=7.0A		40		S
Diode Forward Voltage	V_{SD}	I_S=9.0A,V_{GS}=0V		0.8	1.3	V
Dynamic						
Total Gate Charge	Q_g	V_{DS}=10V,V_{GS}=4.5V I_D≡9.0A		13	19	nC
Gate-Source Charge	Q_{gs}			2.8		
Gate-Drain Charge	Q_{gd}			2.0		
Input Capacitance	C_{iss}	V_{DS}=10V,V_{GS}=0V f=1MHz		1450		pF
Output Capacitance	C_{oss}			285		
Reverse Transfer Capacitance	C_{rss}			145		
Turn-On Time	$t_{d(on)}$	V_{DD}=10V,R_L=1.3Ω I_D≡8.0A,V_{GEN}=10V R_G=1Ω		10	20	ns
	t_r			10	20	
Turn-Off Time	$t_{d(off)}$			25	40	
	t_f			10	20	

Absolute Maximum Ratings (P-Channel)

(T_A=25℃ Unless otherwise noted)

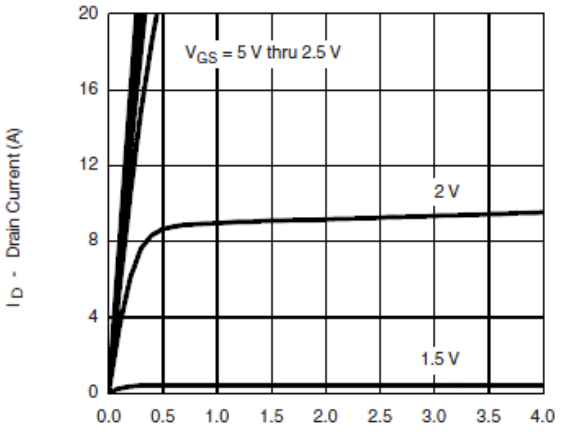
Parameter		Symbol	Typical	Unit
Drain-Source Voltage		V_{DSS}	-20	V
Gate –Source Voltage		V_{GSS}	±12	V
Continuous Drain Current(TJ=150℃)	T_A=25℃	I_D	-9.0	A
	T_A=70℃		-8.0	
Pulsed Drain Current		I_{DM}	-20	A
Continuous Source Current(Diode Conduction)		I_S	-1.7	A
Power Dissipation	T_A=25℃	P_D	3.5	W
	T_A=70℃		2.2	
Operating Junction Temperature		T_J	150	℃
Storage Temperature Range		T_{STG}	-55/150	℃
Thermal Resistance-Junction to Ambient		$R_{\theta JA}$	62.5	℃/W

Electrical Characteristics (P-Channel)

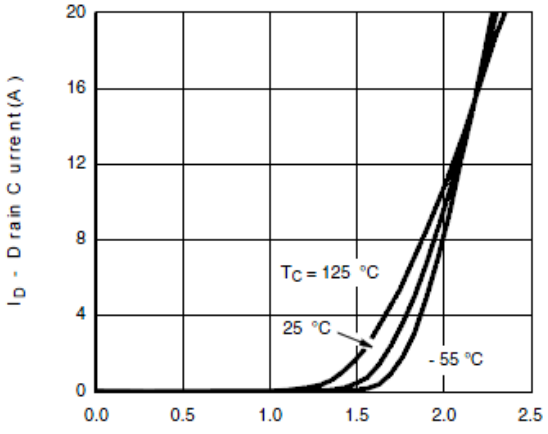
(T_A=25℃ Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V,I_D=-250uA	-20			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=-250uA	-0.4		-1.0	
Gate Leakage Current	I_{GSS}	V_{DS}=0V,V_{GS}=±12V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-16V,V_{GS}=0V			-1	uA
		V_{DS}=-16V,V_{GS}=0V T_J=85℃			-10	
On-State Drain Current	$I_{D(on)}$	V_{DS}≦-5V,V_{GS}=-4.5V	-10			A
		V_{DS}≦-5V,V_{GS}=-2.5V	-5			
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS}=-4.5V,I_D=-9A		21	33	mΩ
		V_{GS}=-2.5V,I_D=-8A		32	42	
		V_{GS}=-1.8V,I_D=-6A		54	68	
Forward Transconductance	g_{FS}	V_{DS}=-9V,I_D=-6A		14		S
Diode Forward Voltage	V_{SD}	I_S=-2.5A,V_{GS}=0V		-0.85	-1.2	V
Dynamic						
Total Gate Charge	Q_g	V_{DS}=-15V,V_{GS}=-4.5V I_D≡-6.0A		10	18	nC
Gate-Source Charge	Q_{gs}			1.6		
Gate-Drain Charge	Q_{gd}			3.0		
Input Capacitance	C_{iss}	V_{DS}=-15V,V_{GS}=0V f=1MHz		950		pF
Output Capacitance	C_{oss}			200		
Reverse Transfer Capacitance	C_{rss}			175		
Turn-On Time	$t_{d(on)}$	V_{DD}=-15V,R_L=15Ω I_D≡-5.0A,V_{GEN}=-10V R_G=6Ω		8	18	ns
	t_r			8	18	
Turn-Off Time	$t_{d(off)}$			25	50	
	t_f			25	35	

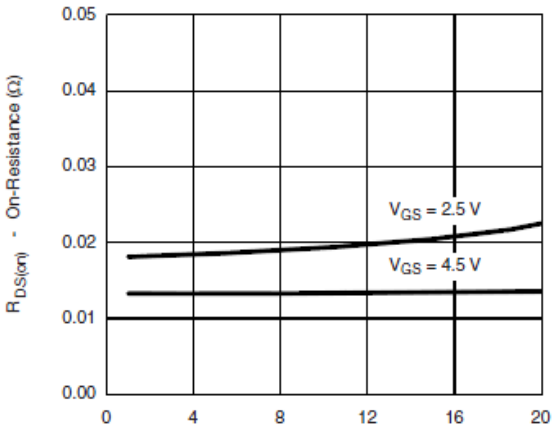
Typical Characteristics (N-Channel)



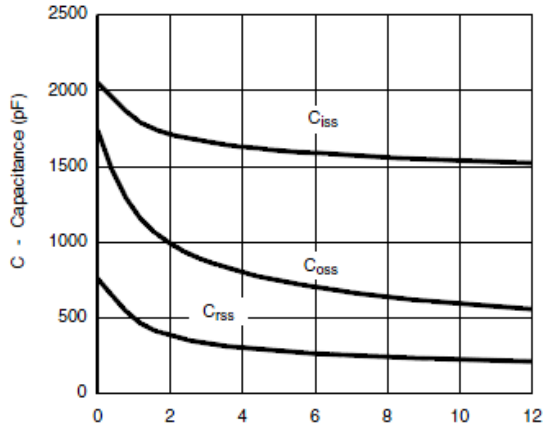
Output Characteristics



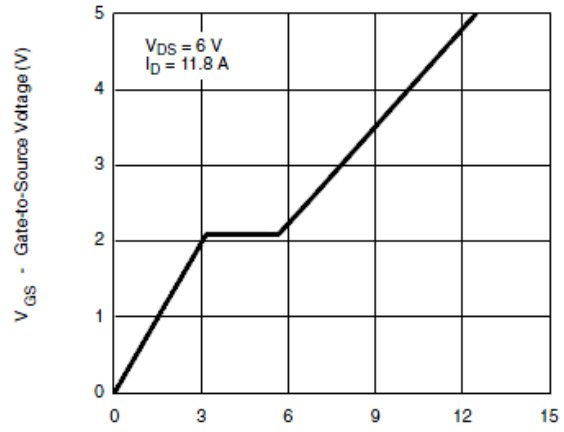
Transfer Characteristics



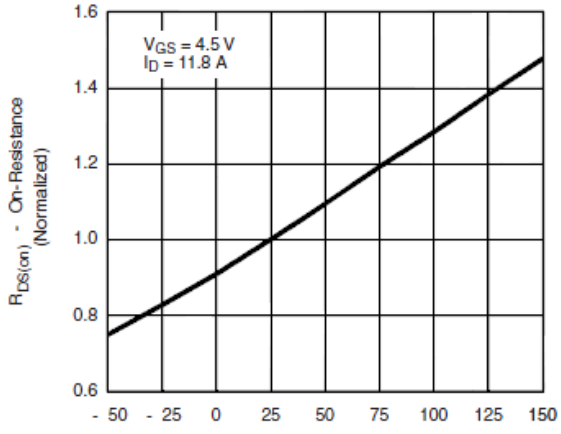
On-Resistance vs. Drain Current



Capacitance

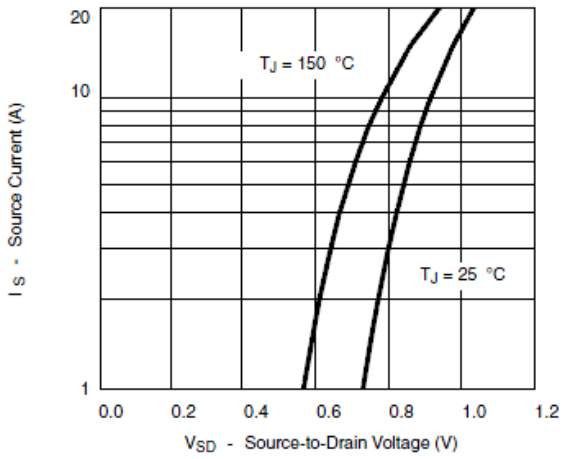


Gate Charge

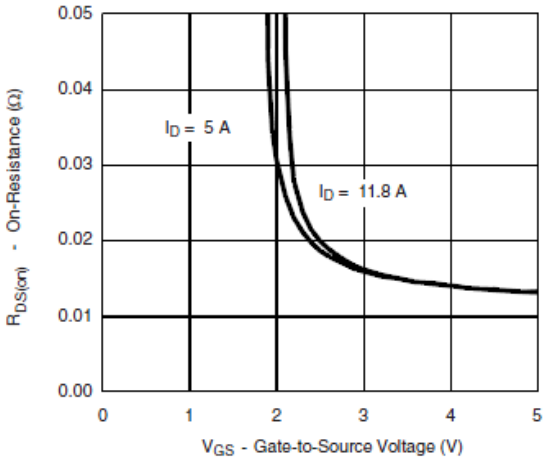


On-Resistance vs. Junction Temperature

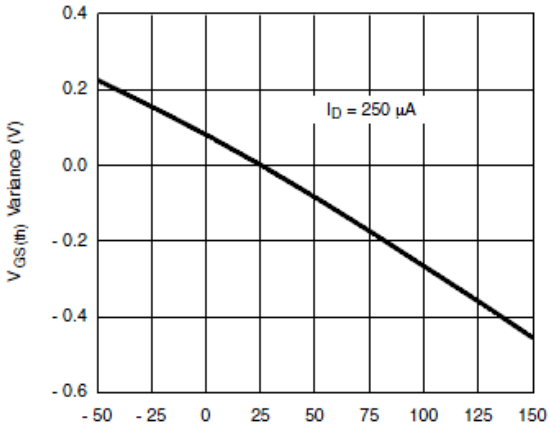
Typical Characteristics (N-Channel)



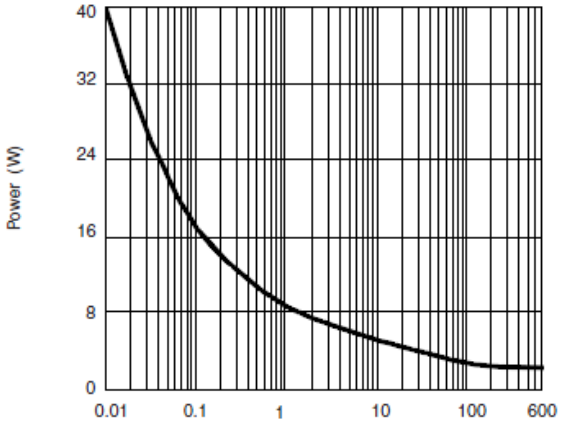
Source-Drain Diode Forward Voltage



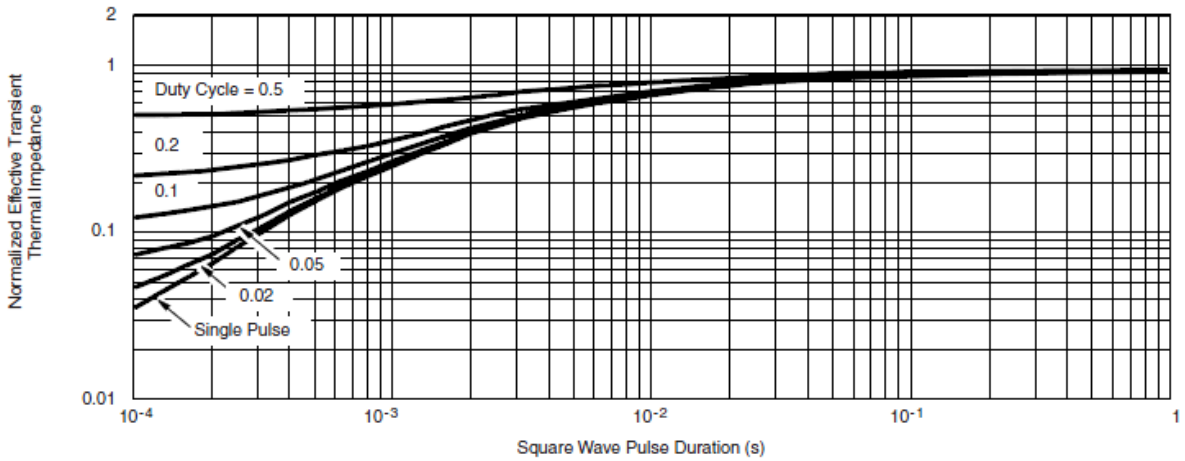
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

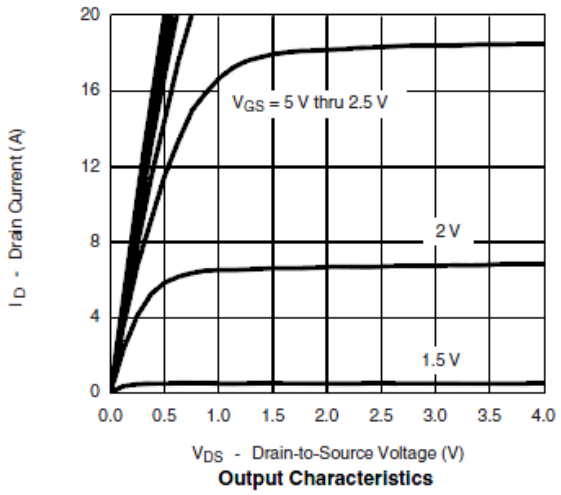


Single Pulse Power

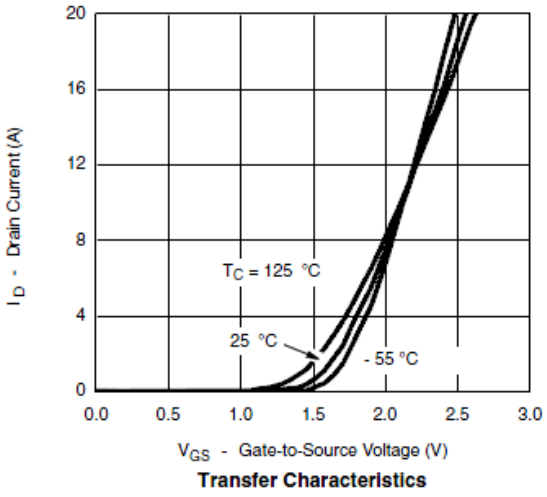


Normalized Thermal Transient Impedance, Junction-to-Case

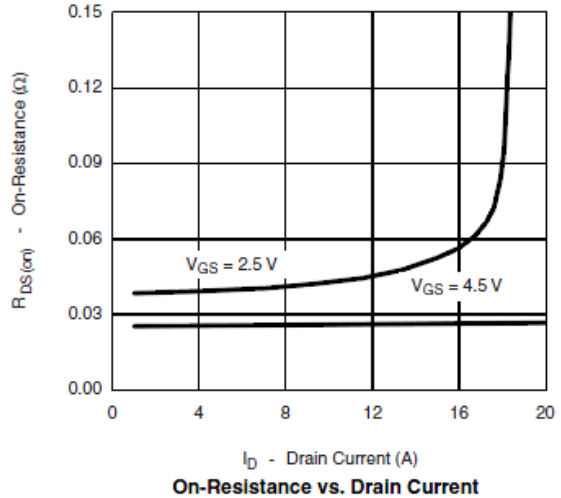
Typical Characteristics (P-Channel)



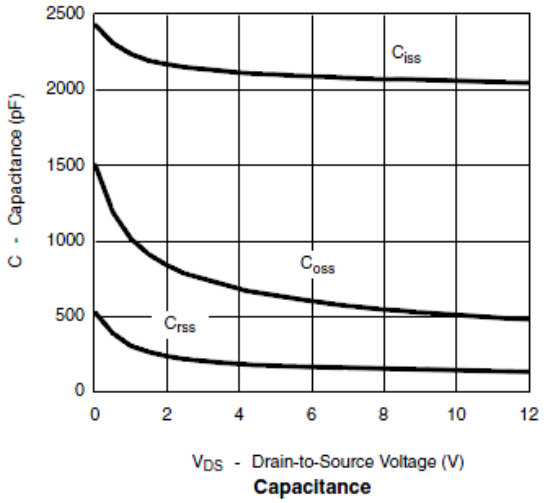
Output Characteristics



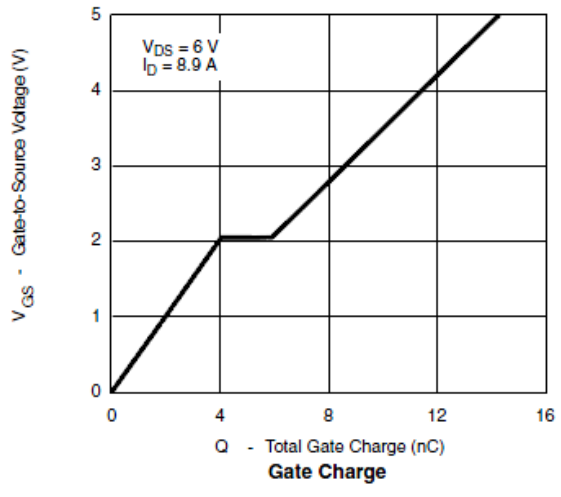
Transfer Characteristics



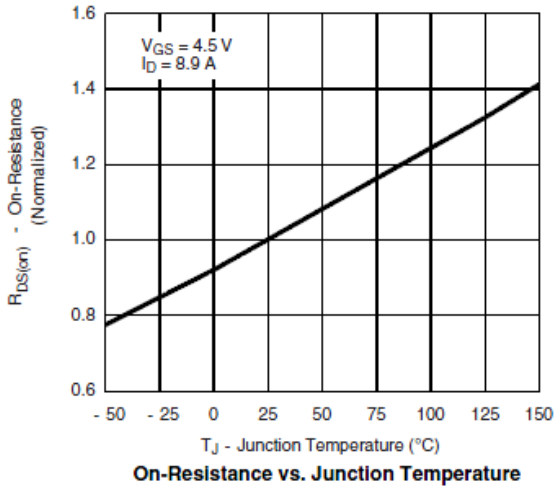
On-Resistance vs. Drain Current



Capacitance

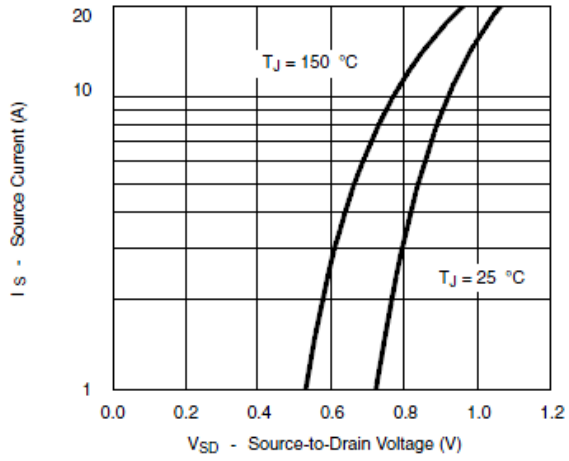


Gate Charge

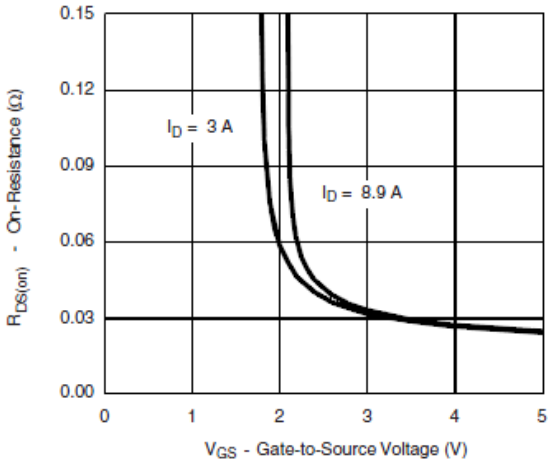


On-Resistance vs. Junction Temperature

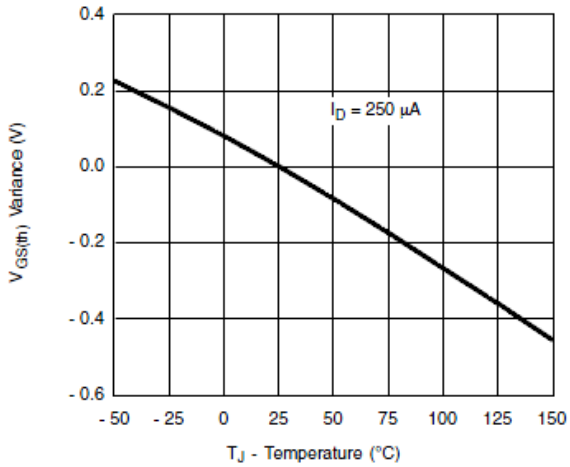
Typical Characteristics (P-Channel)



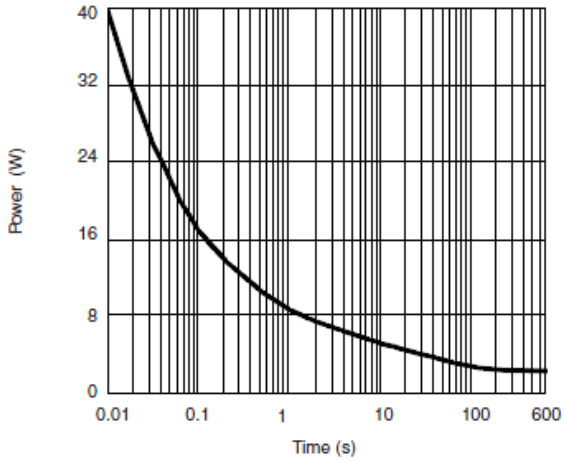
Source-Drain Diode Forward Voltage



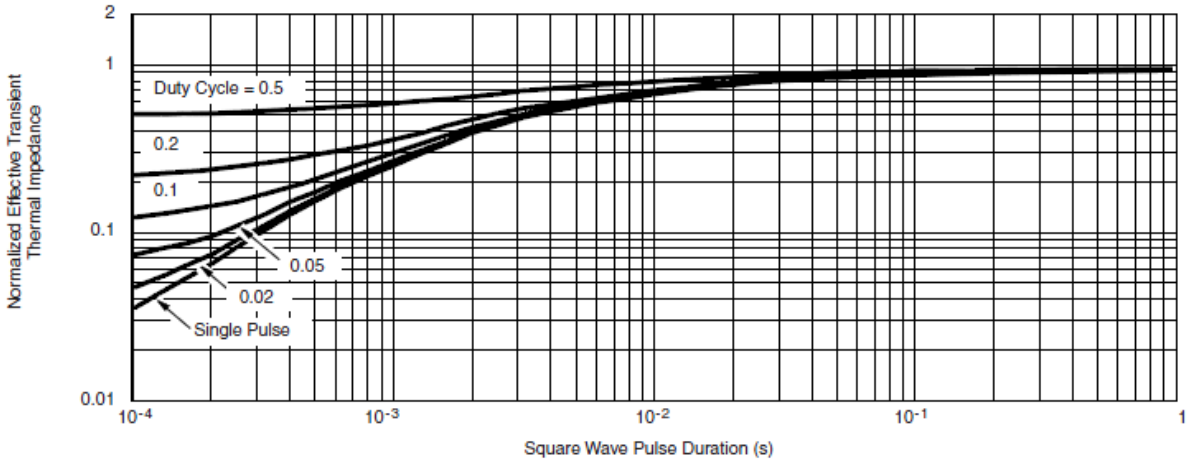
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



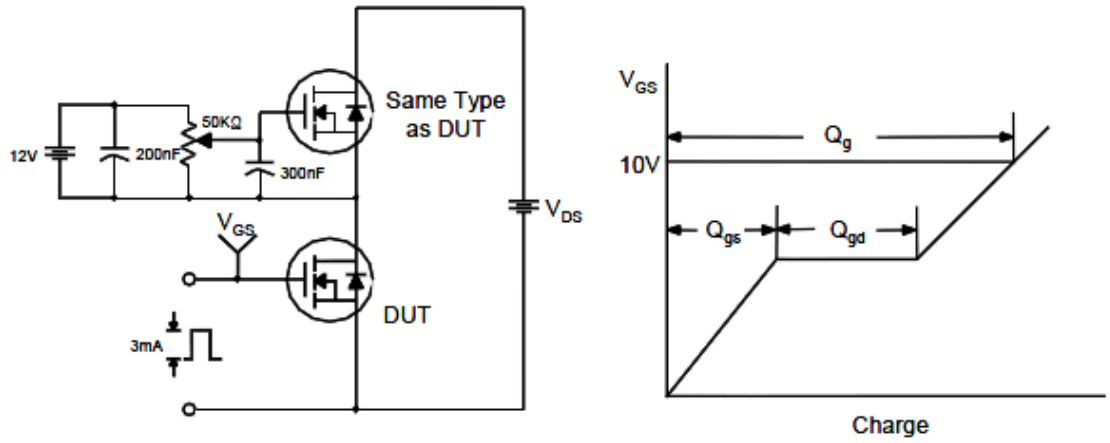
Single Pulse Power



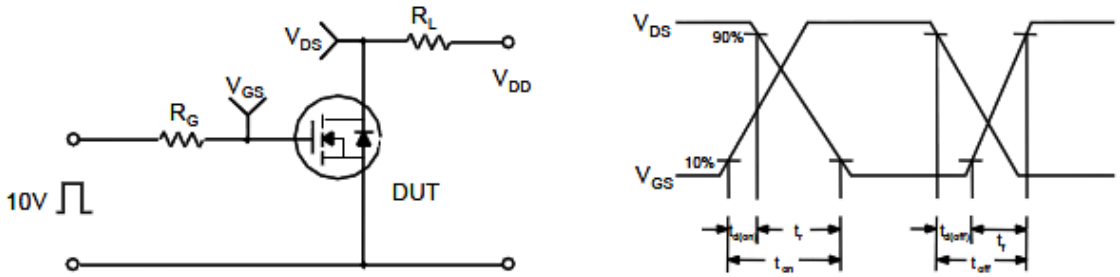
Normalized Thermal Transient Impedance, Junction-to-Case

Typical Characteristics

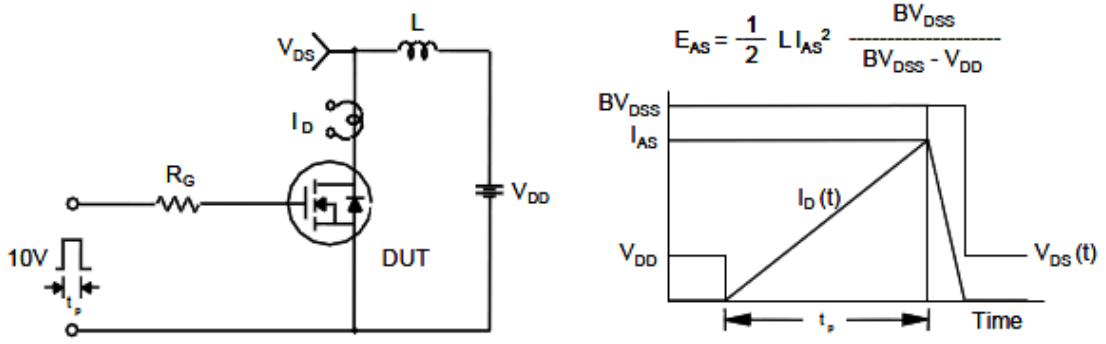
Gate Charge Test Circuit & Waveform



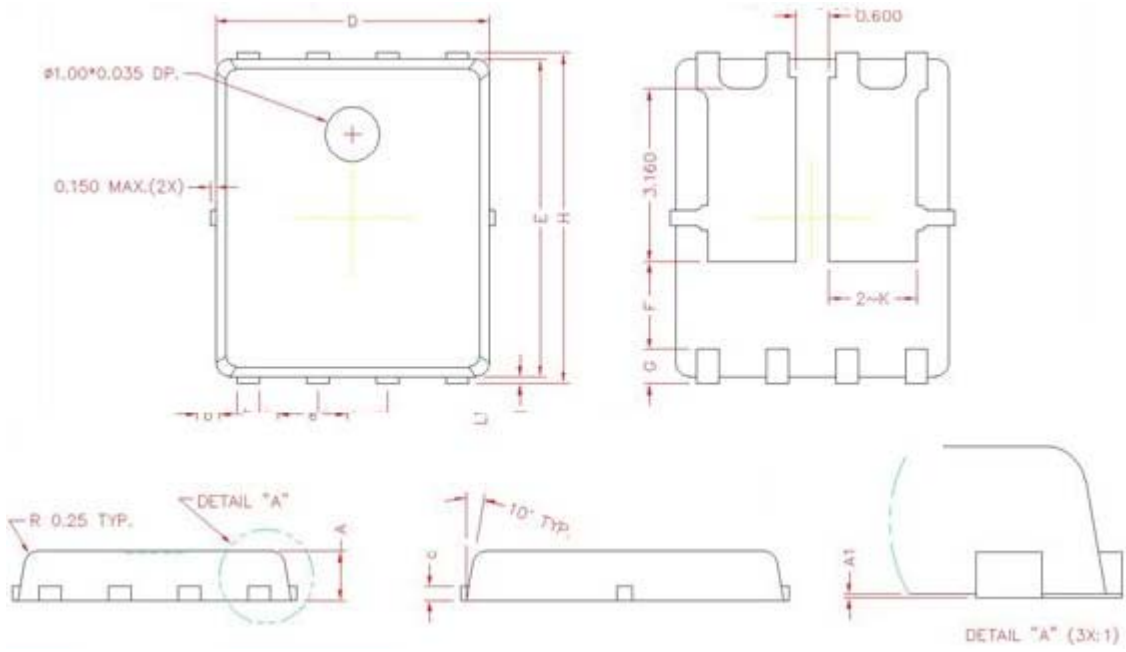
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Package Information (DFN 5X6-8L)



DIMENSIONS

REF.	Millimeters		REF.	Millimeters	
	Min.	Max.		Min.	Max.
A	0.80	1.00	E	5.70	5.90
A1	0.00	0.05	e	1.27 BSC.	
b	0.35	0.49	H	5.95	6.20
c	0.254 Ref.		L1	0.10	0.18
D	4.90	5.10	G	0.60 Ref.	
F	1.60 Ref.		K	1.60 Ref.	

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