AFC5614
40V N & P Pair
Enhancement Mode MOSFET

General Description

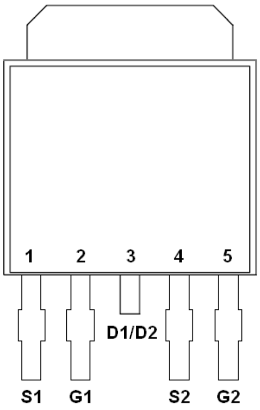
AFC5614, N & P Pair enhancement mode MOSFET, uses Advanced Trench Technology to provide excellent RDS(ON), low gate charge. These devices are particularly suited for low voltage power management, and low in-line power loss are needed in commercial industrial surface mount applications.

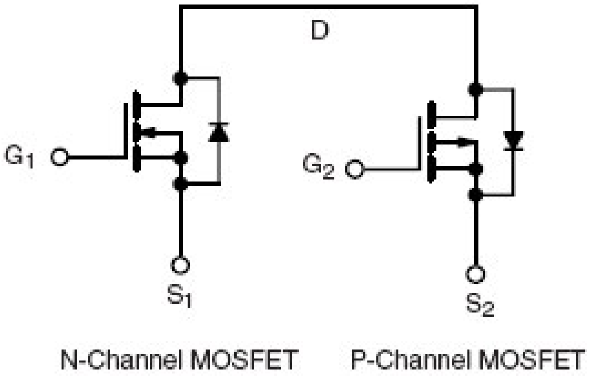
Features

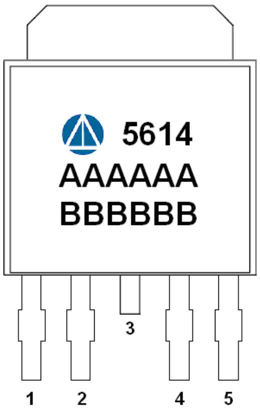
N-Channel
- 40V/7A,$R_{DS(ON)}$= 35mΩ@V_{GS}=10V
- 40V/6A,$R_{DS(ON)}$= 42mΩ@V_{GS}=4.5V

P-Channel
- -40V/-6.0A,$R_{DS(ON)}$= 65mΩ@V_{GS}= -10V
- -40V/-5.0A,$R_{DS(ON)}$= 95mΩ@V_{GS}= -4.5V

Pin Description (TO-252-4L)







Application

- DC/DC Conversion
- Load Switch
- DC FAN

Pin Define

Pin	Symbol	Description
1	S1	Source 1
2	G1	Gate 1
3	D1 / D2	Drain 1 / Drain 2
4	S2	Source 2
5	G2	Gate 2

Ordering Information

Part Ordering No.	Part Marking	Package	Unit	Quantity
AFC5614T254RG	5614	TO-252-4L	Tape & Reel	2500 EA

※ A Lot code
※ B Date code
※ AFC5614T254RG : 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}	40	V
Gate –Source Voltage		V_{GSS}	±20	V
Continuous Drain Current(T_J=150℃)	T_C=25℃	I_D	12	A
	T_C=70℃		10	
Pulsed Drain Current		I_{DM}	30	A
Continuous Source Current(Diode Conduction)		I_S	1.5	A
Power Dissipation	T_C=25℃	P_D	22	W
	T_C=70℃		12	
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	40			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250uA	1.0		2.0	
Gate Leakage Current	I_{GSS}	V_{DS}=0V,V_{GS}=±20V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=32V,V_{GS}=0V			1	uA
		V_{DS}=32V,V_{GS}=0V T_J=85℃			10	
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=7A		26	35	mΩ
		V_{GS}=4.5V,I_D=6A		32	42	
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=12A		25		S
Diode Forward Voltage	V_{SD}	I_S=2A,V_{GS}=0V		0.8	1.3	V
Dynamic						
Total Gate Charge	Q_g	V_{DS}=20V,V_{GS}=4.5V I_D= 5A		10	14	nC
Gate-Source Charge	Q_{gs}			2.8		
Gate-Drain Charge	Q_{gd}			3.2		
Input Capacitance	C_{iss}	V_{DS}=20V,V_{GS}=0V f=1MHz		750		pF
Output Capacitance	C_{oss}			110		
Reverse Transfer Capacitance	C_{rss}			75		
Turn-On Time	$t_{d(on)}$	V_{DD}=20V,R_L=4Ω I_D≡5.0A,V_{GEN}=10V R_G=1Ω		6	12	ns
	t_r			10	20	
Turn-Off Time	$t_{d(off)}$			20	36	
	t_f			6	12	

Absolute Maximum Ratings (P-Channel)

(T_A=25℃ Unless otherwise noted)

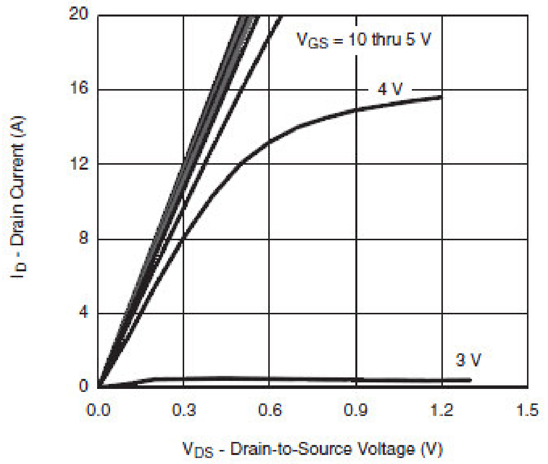
Parameter		Symbol	Typical	Unit
Drain-Source Voltage		V_{DSS}	-40	V
Gate –Source Voltage		V_{GSS}	±20	V
Continuous Drain Current(TJ=150℃)	T_C=25℃	I_D	-12	A
	T_C=70℃		-10	
Pulsed Drain Current		I_{DM}	-30	A
Continuous Source Current(Diode Conduction)		I_S	-1.7	A
Power Dissipation	T_C=25℃	P_D	22	W
	T_C=70℃		12	
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)

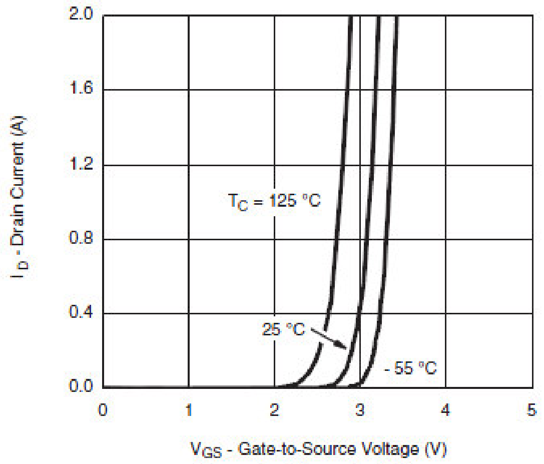
(T_A=25℃ Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V,I_D= -250uA	-40			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D= -250uA	-1.0		-2.0	
Gate Leakage Current	I_{GSS}	V_{DS}=0V,V_{GS}= ±20V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}= -32V,V_{GS}=0V			-1	uA
		V_{DS}= -32V,V_{GS}=0V T_J=85℃			-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=-6.0A		60	65	mΩ
		V_{GS} = -4.5V,I_D=-5.0A		85	95	
Forward Transconductance	g_{FS}	V_{DS}= -5V,I_D= -12A		25		S
Diode Forward Voltage	V_{SD}	I_S= -2A,V_{GS}=0V		-0.8	-1.3	V
Dynamic						
Total Gate Charge	Q_g	V_{DS}=-20V,V_{GS}=-4.5V I_D= -5.0A		13	20	nC
Gate-Source Charge	Q_{gs}			4.5		
Gate-Drain Charge	Q_{gd}			6.5		
Input Capacitance	C_{iss}	V_{DS}=-20V,V_{GS}=0V f=1MHz		1100		pF
Output Capacitance	C_{oss}			195		
Reverse Transfer Capacitance	C_{rss}			105		
Turn-On Time	$t_{d(on)}$	V_{DD}=-20V,R_L=4Ω I_D≡-5.0A,V_{GEN}=-4.5V R_G=1Ω		40	80	ns
	t_r			55	100	
Turn-Off Time	$t_{d(off)}$			30	60	
	t_f			12	20	

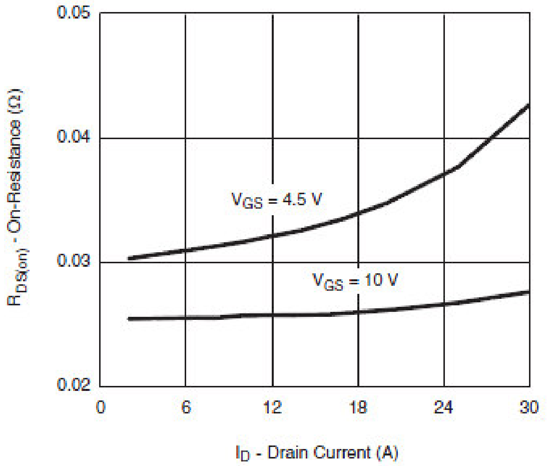
Typical Characteristics (N-Channel)



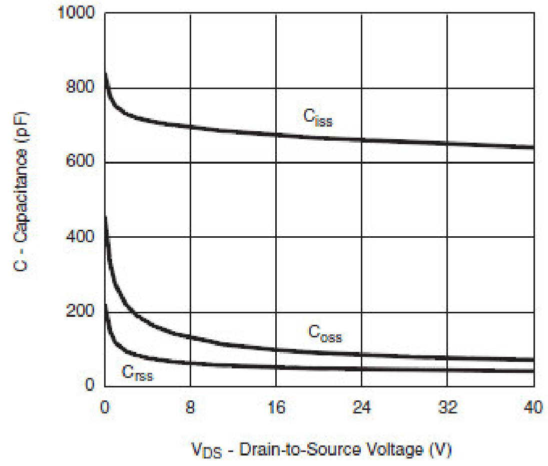
Output Characteristics



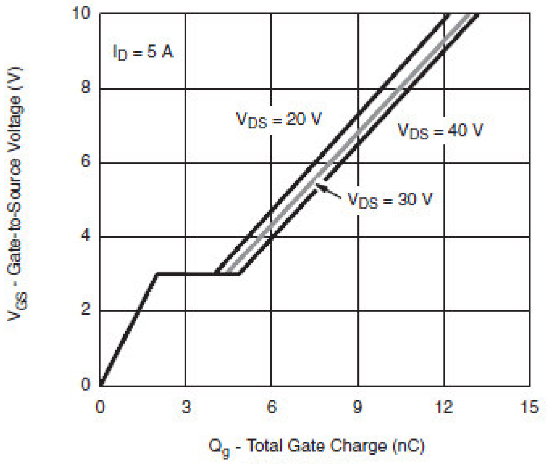
Transfer Characteristics



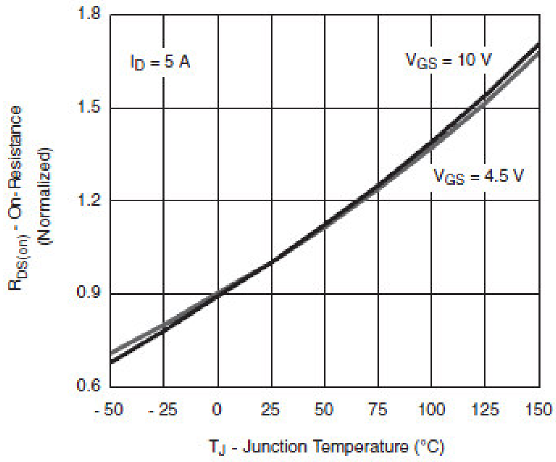
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

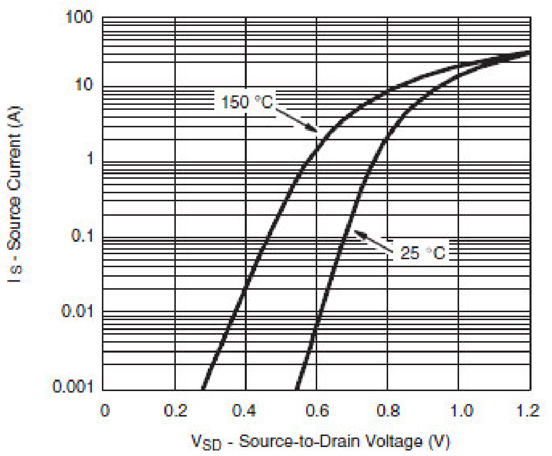


Gate Charge

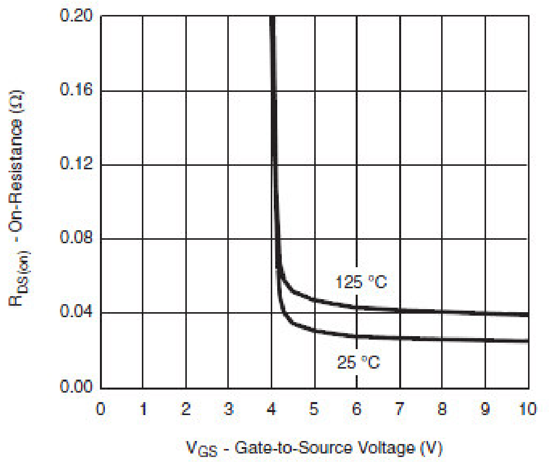


On-Resistance vs. Junction Temperature

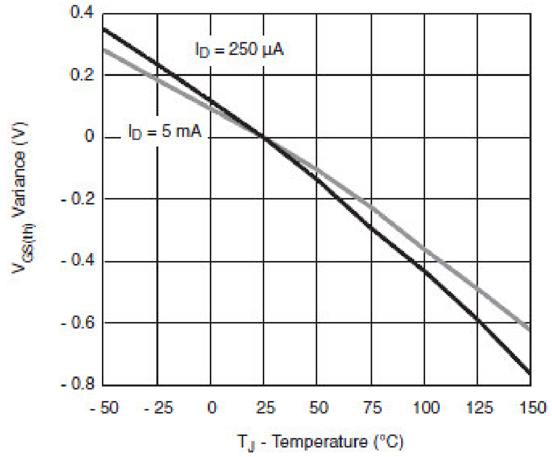
Typical Characteristics (N-Channel)



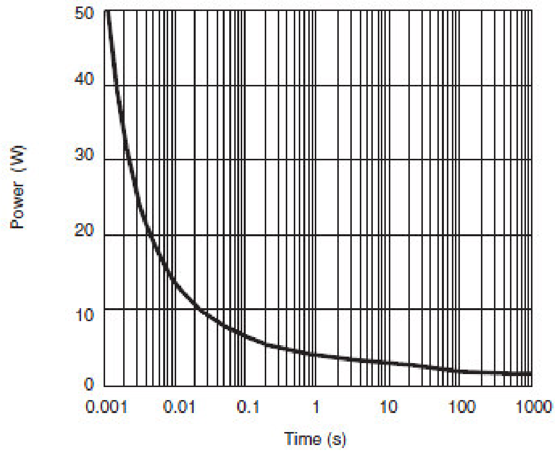
Source-Drain Diode Forward Voltage



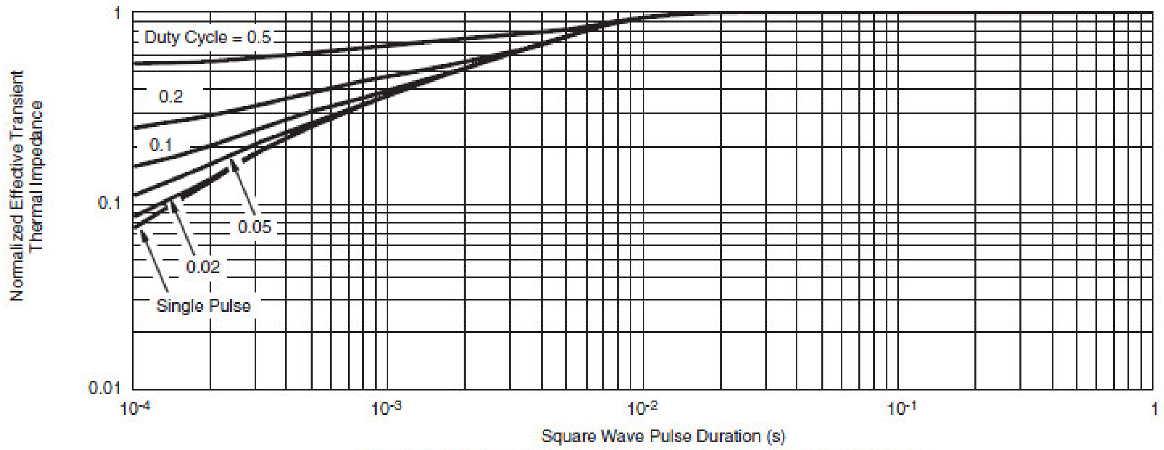
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

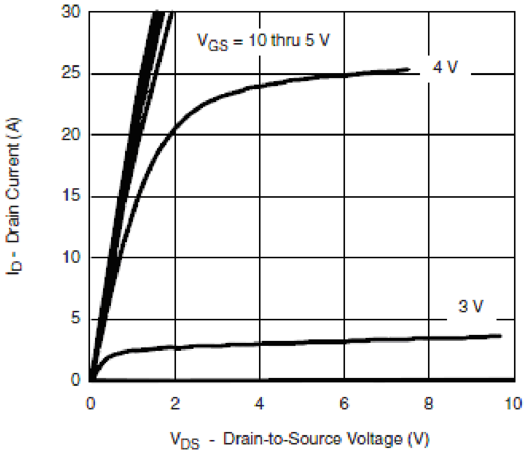


Single Pulse Power, Junction-to-Ambient

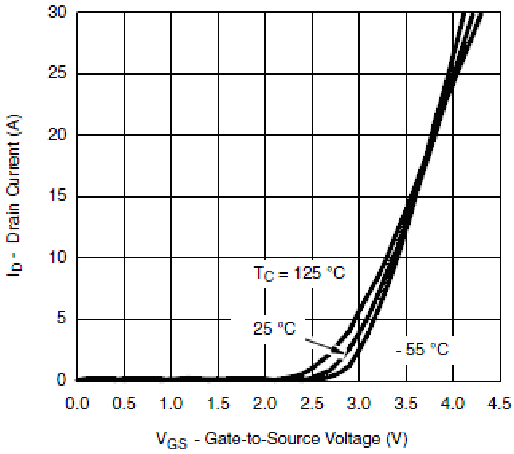


Normalized Thermal Transient Impedance, Junction-to-Case

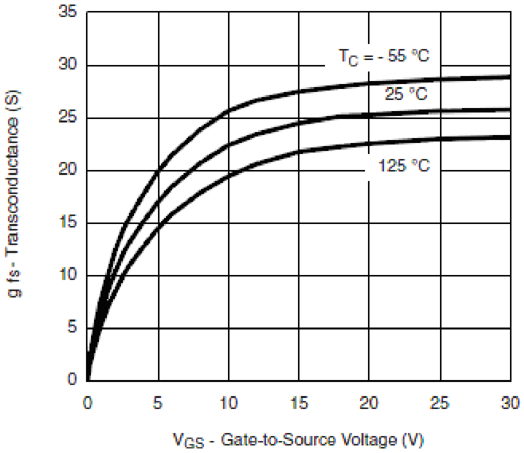
Typical Characteristics (P-Channel)



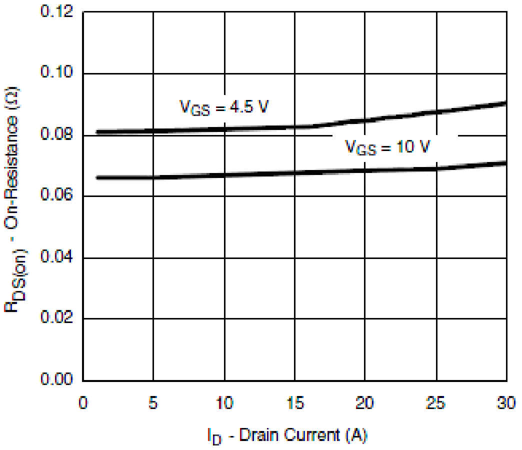
Output Characteristics



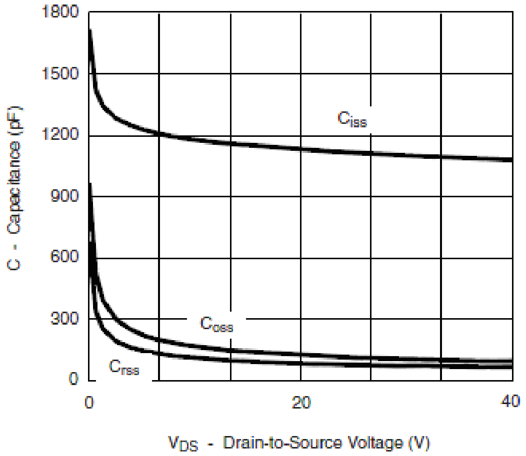
Transfer Characteristics



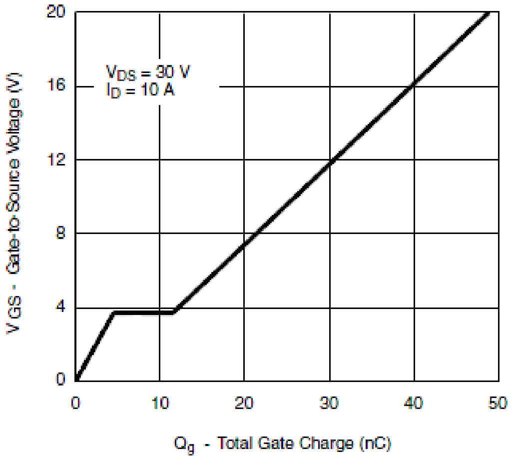
Transconductance



On-Resistance vs. Drain Current

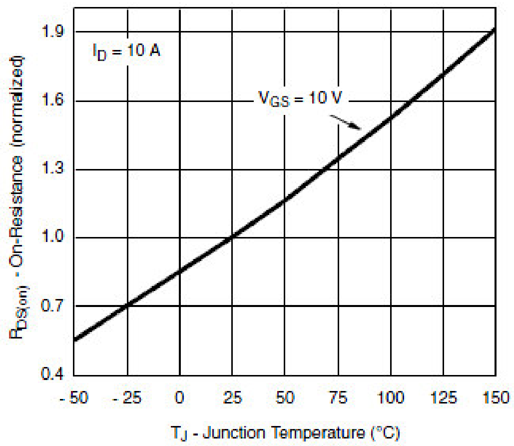


Capacitance

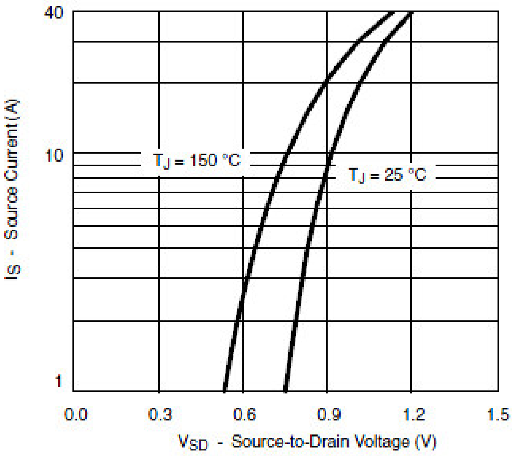


Gate Charge

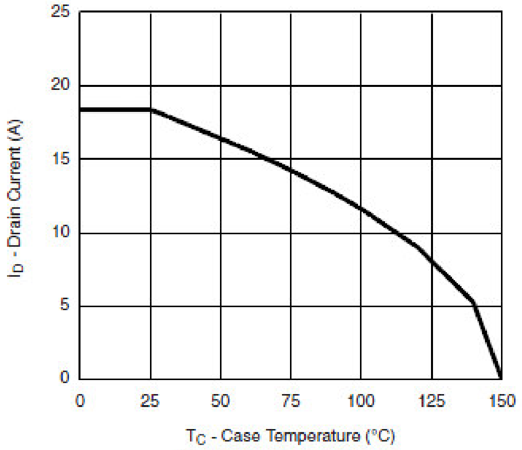
Typical Characteristics (P-Channel)



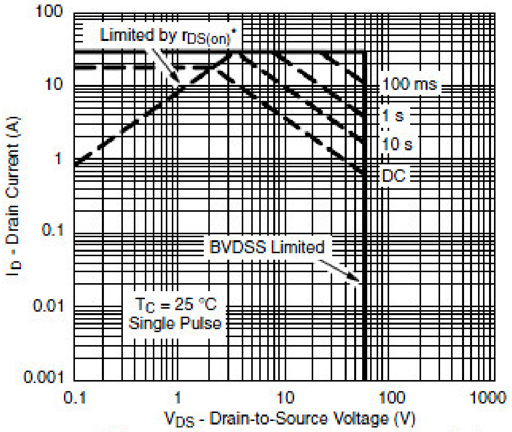
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

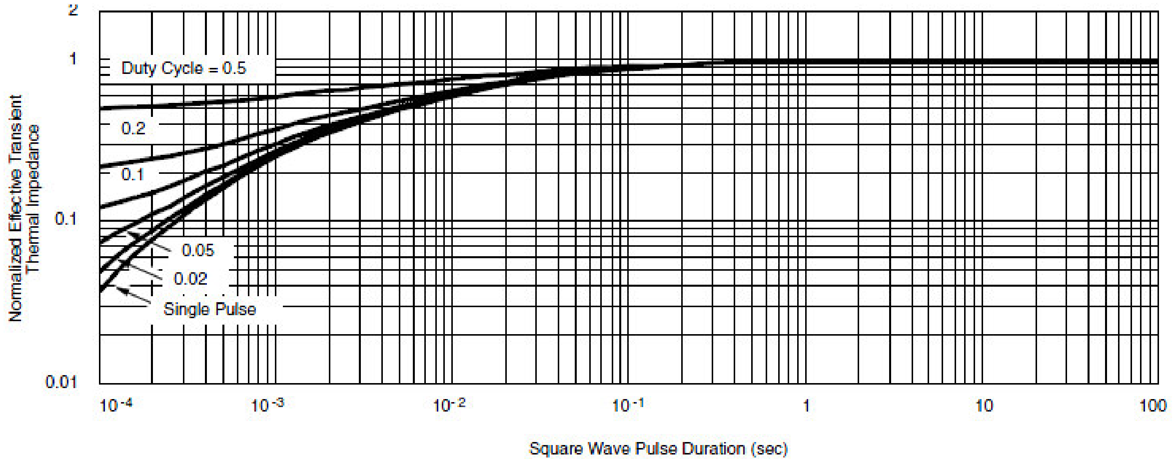


Maximum Drain Current vs. Case Temperature



* V_{GS} > minimum V_{GS} at which $r_{DS(on)}$ is specified

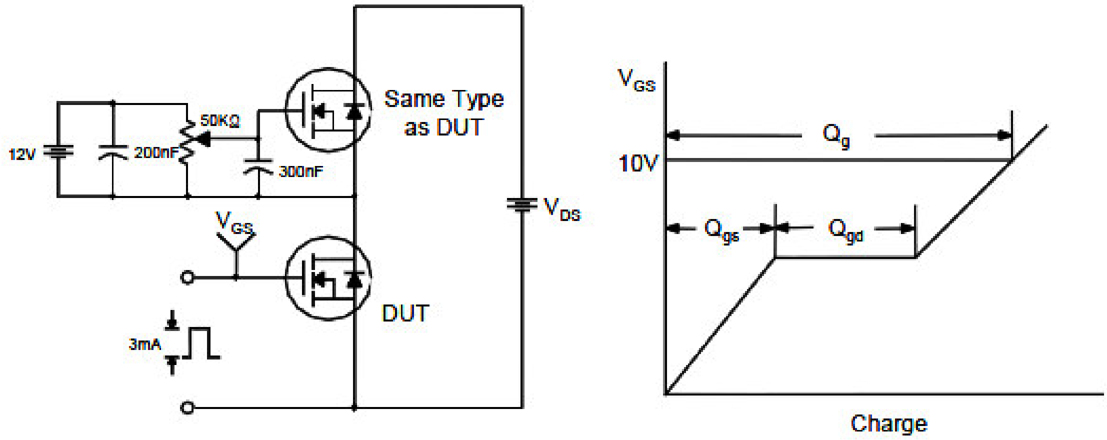
Safe Operating Area



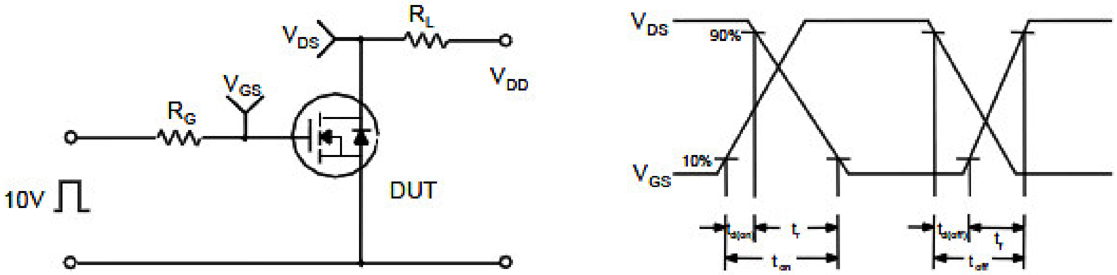
Normalized Thermal Transient Impedance, Junction-to-Case

Typical Characteristics

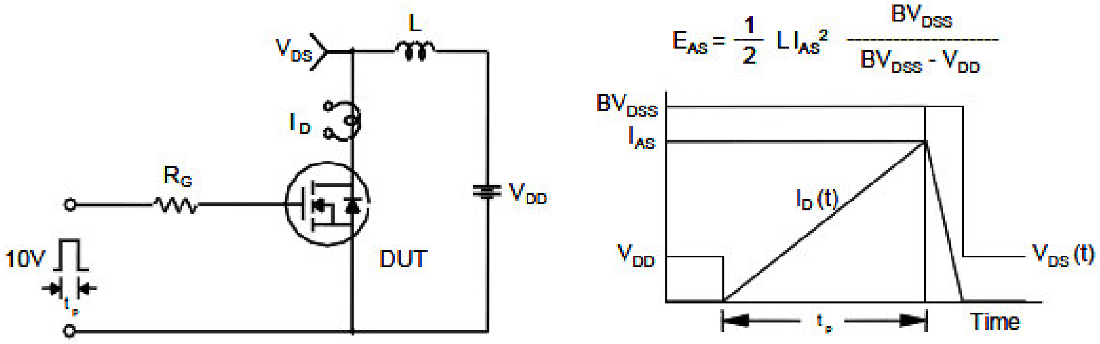
Gate Charge Test Circuit & Waveform



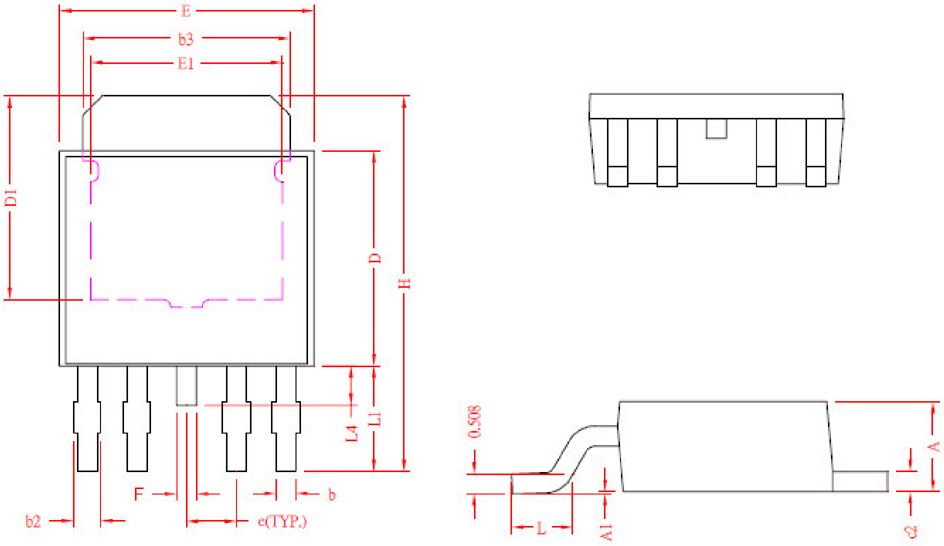
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Package Information (TO-252-4L)



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	2.20	2.40	E	6.40	6.80
A1	0	0.15	E1	3.81	---
b	0.40	0.60	e	1.27 REF.	
b2	0.50	0.80	F	0.40	0.60
b3	5.20	5.50	H	9.40	10.20
c2	0.45	0.55	L	1.40	1.77
D	5.40	5.80	L1	2.40	3.00
D1	4.57	---	L4	0.80	1.20

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