



### General Description

AFC5616, 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

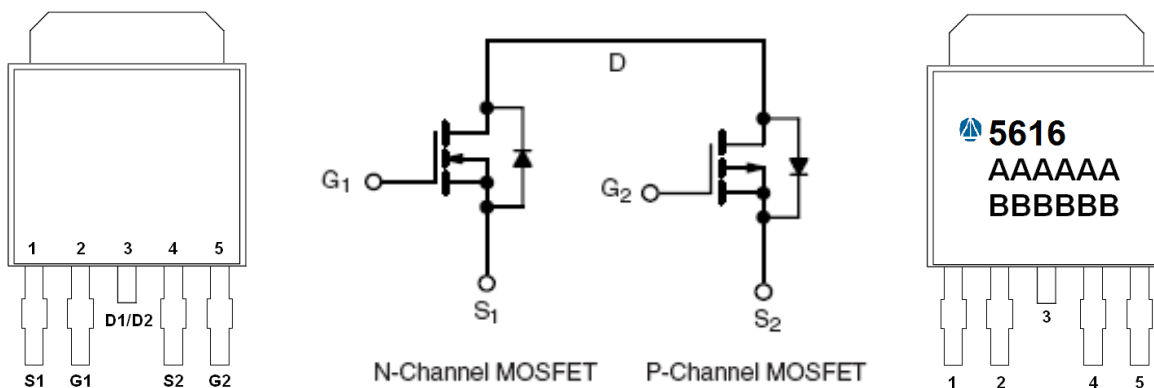
N-Channel

- 60V/7.0A,  $R_{DS(ON)}=34m\Omega@V_{GS}=10V$
- 60V/6.0A,  $R_{DS(ON)}=40m\Omega@V_{GS}=4.5V$

P-Channel

- -60V/-7A,  $R_{DS(ON)}=56m\Omega@V_{GS}=-10V$
- -60V/-6A,  $R_{DS(ON)}=68m\Omega@V_{GS}=-4.5V$

### 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
AFC5616T254RG	5616	TO-252-4L	Tape & Reel	2500 EA

※ A Lot code

※ B Date code

※ AFC5616T254RG : 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>	1.5	A
Power Dissipation	P <sub>D</sub>	T <sub>A</sub> =25°C	2.8
		T <sub>A</sub> =70°C	1.8
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	34	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =6.0A		30	40	
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> =2.0A, 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> =70°C	-6.0
Pulsed Drain Current	I <sub>DM</sub>	-30	A
Continuous Source Current(Diode Conduction)	I <sub>S</sub>	-1.7	A
Power Dissipation	P <sub>D</sub>	T <sub>A</sub> =25°C	2.8
		T <sub>A</sub> =70°C	1.8
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

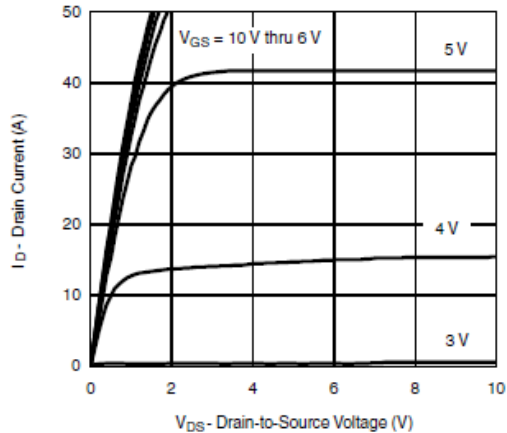
### Electrical Characteristics ( P-Channel )

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

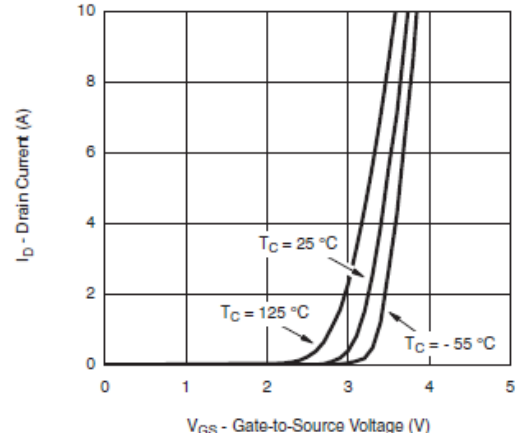
Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> = -250uA	-60			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> = -250uA	-1.0		-2.5	
Gate Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V			±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> =-7A		46	56	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> =-6A		56	68	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = -15V, I <sub>D</sub> = -3.2A		12		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> = -10.0A		25	40	nC
Gate-Source Charge	Q <sub>gs</sub>			5		
Gate-Drain Charge	Q <sub>gd</sub>			8		
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> ≡-18A, V <sub>GEN</sub> =-10V R <sub>G</sub> =2.5Ω		10	20	ns
	t <sub>r</sub>			10	20	
Turn-Off Time	t <sub>d(off)</sub>				45	
	t <sub>f</sub>			25	40	



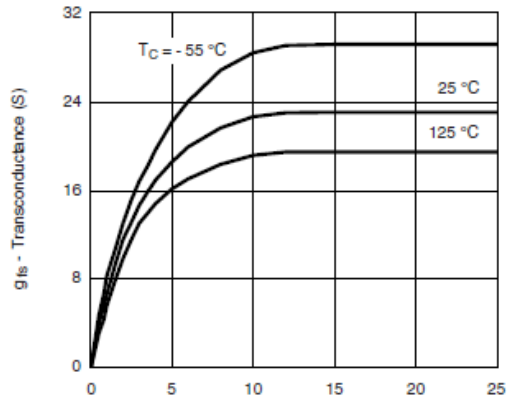
## Typical Characteristics ( N-Channel )



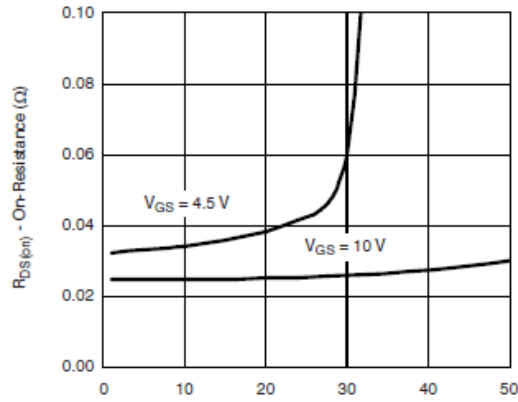
Output Characteristics



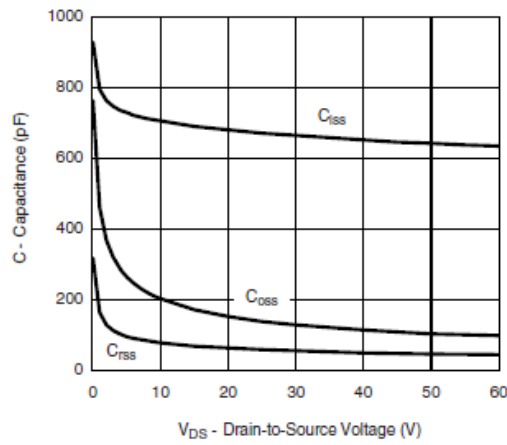
Transfer Characteristics



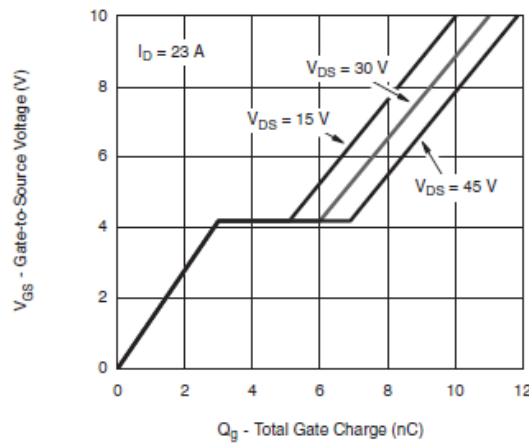
Transconductance



On-Resistance vs. Drain Current



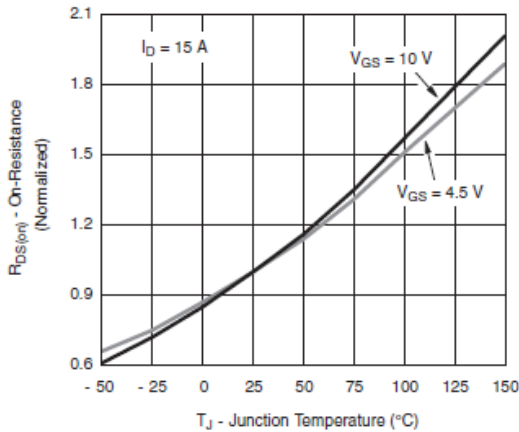
Capacitance



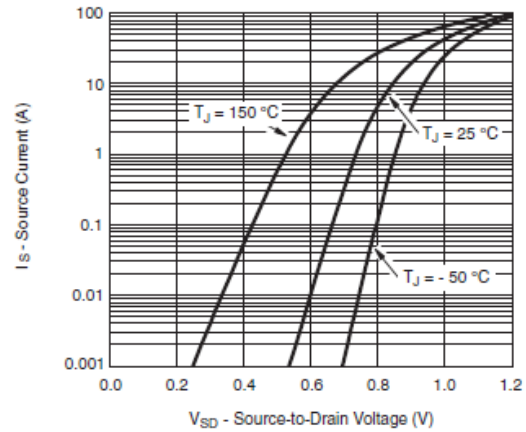
Gate Charge



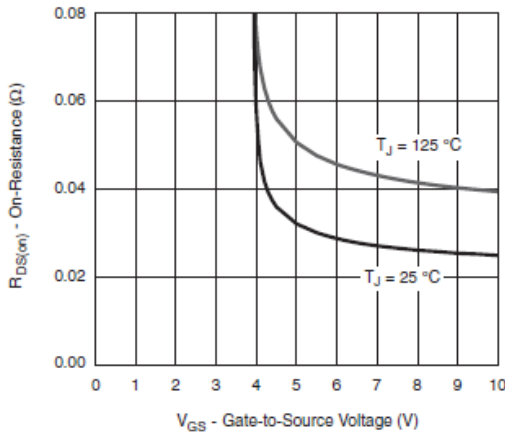
### Typical Characteristics ( N-Channel )



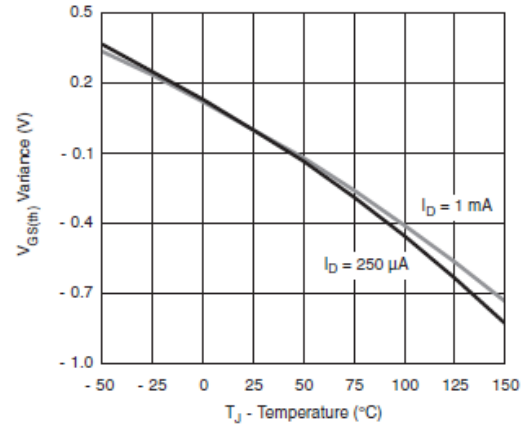
On-Resistance vs. Junction Temperature



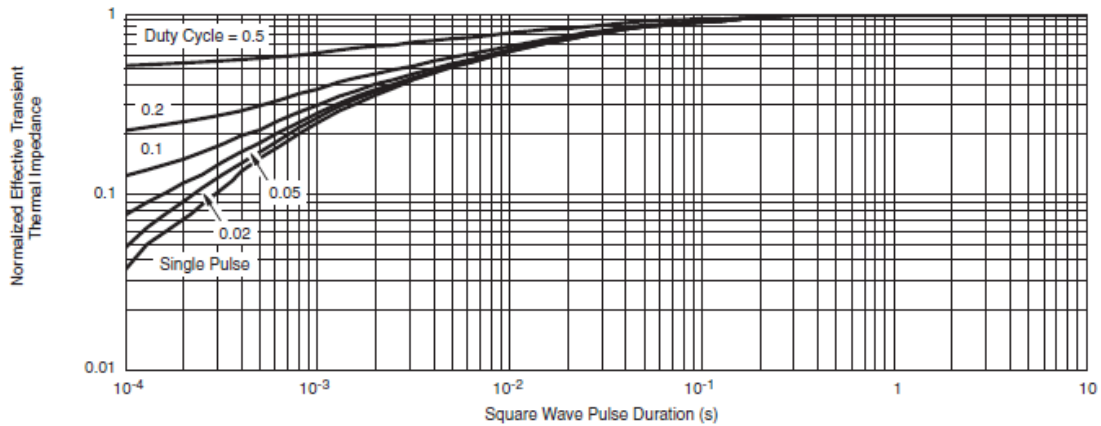
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



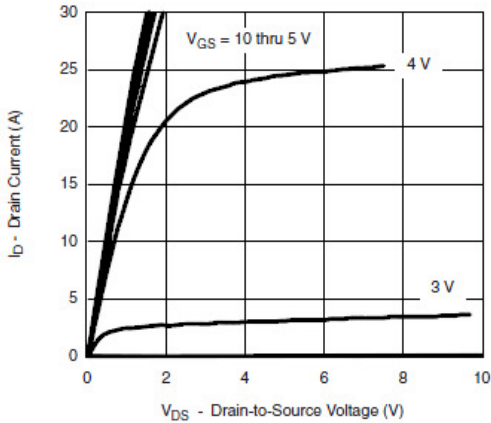
Threshold Voltage



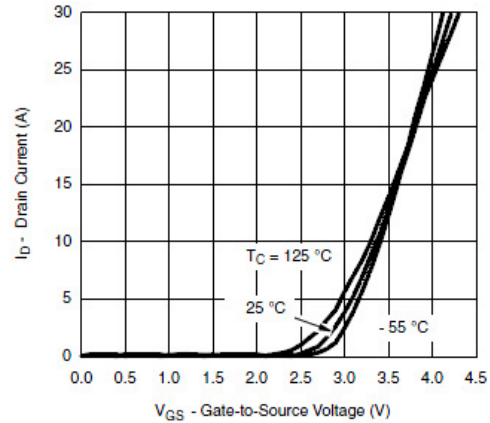
Normalized Thermal Transient Impedance, Junction-to-Case



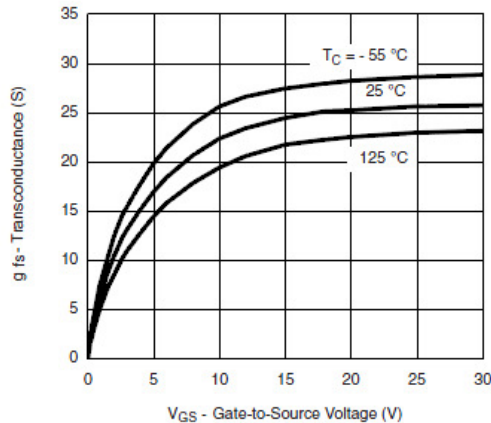
**Typical Characteristics ( P-Channel )**



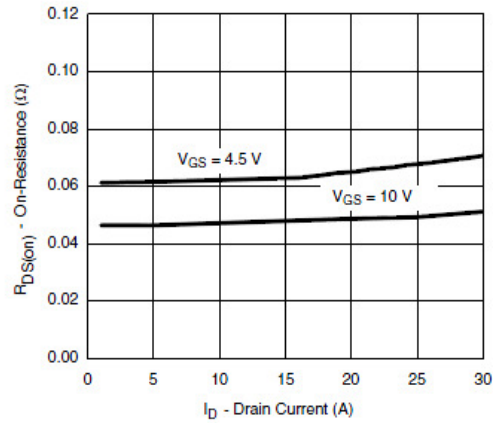
**Output Characteristics**



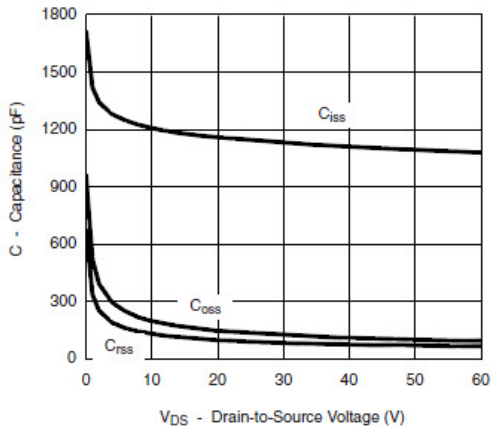
**Transfer Characteristics**



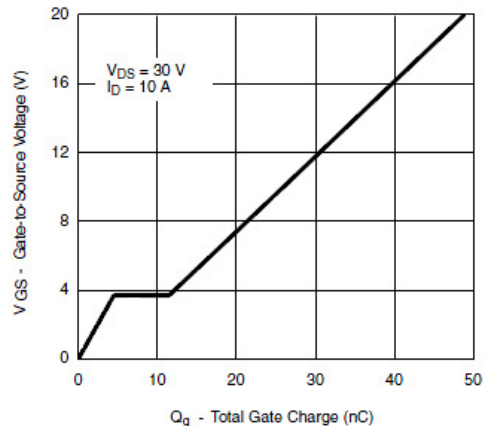
**Transconductance**



**On-Resistance vs. Drain Current**



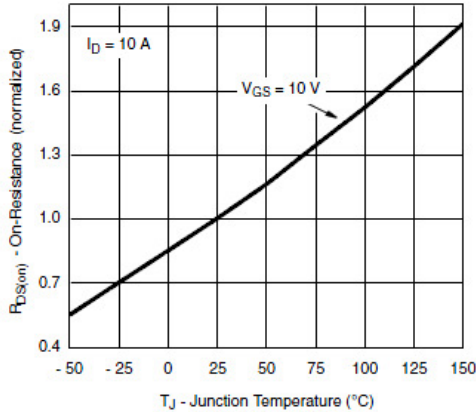
**Capacitance**



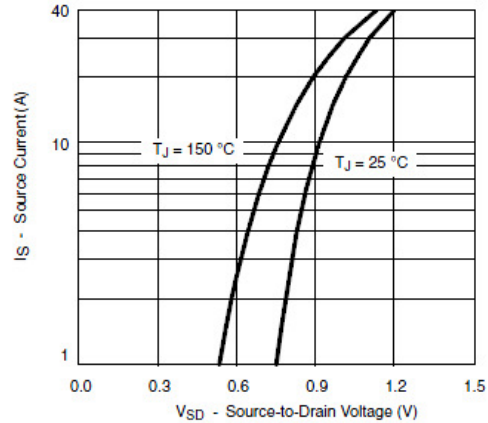
**Gate Charge**



### Typical Characteristics ( P-Channel )

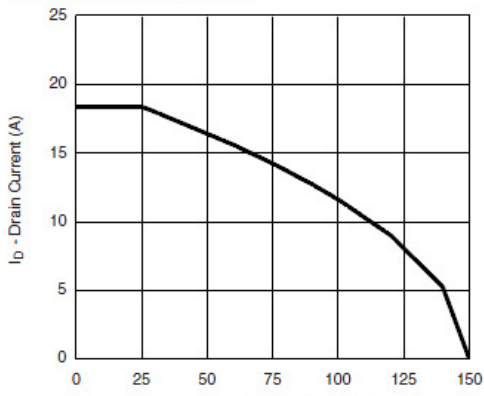


On-Resistance vs. Junction Temperature

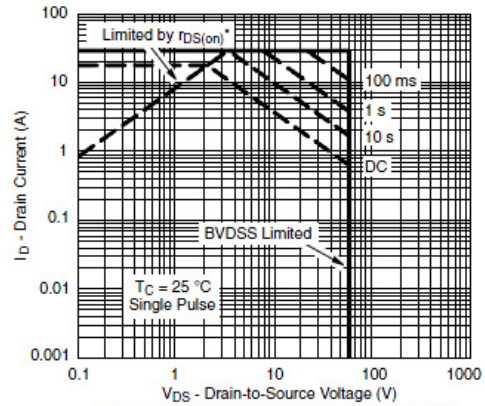


Source-Drain Diode Forward Voltage

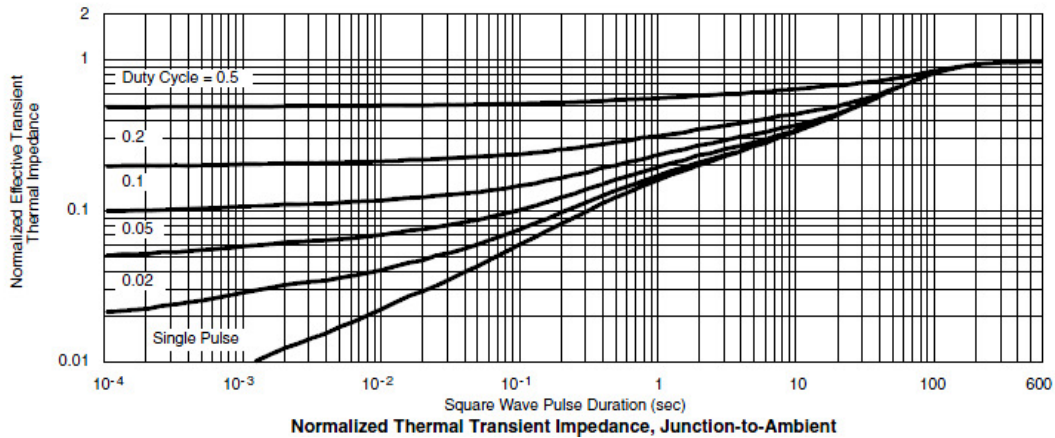
### THERMAL RATINGS



Maximum Drain Current vs. Case Temperature



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

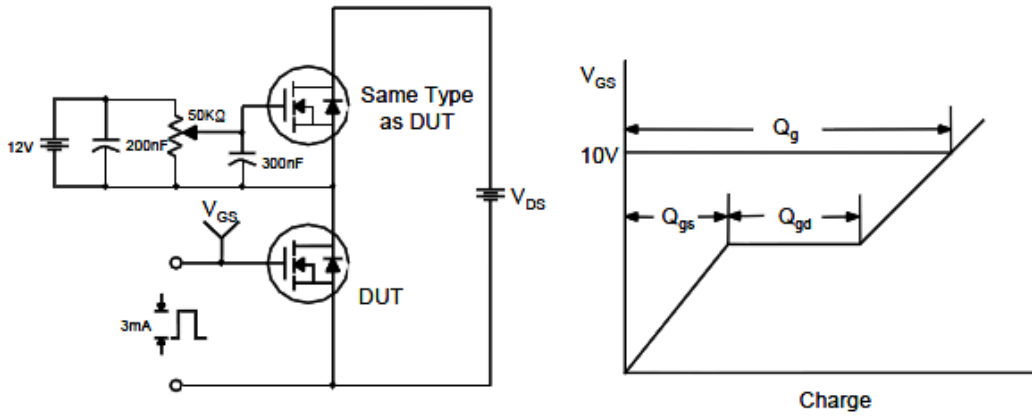


Normalized Thermal Transient Impedance, Junction-to-Ambient

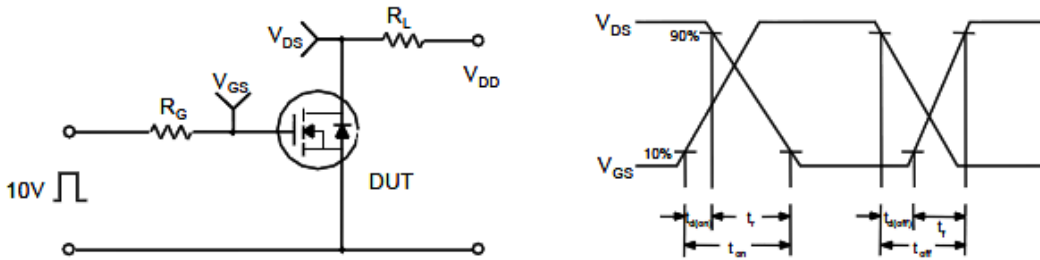


Typical Characteristics

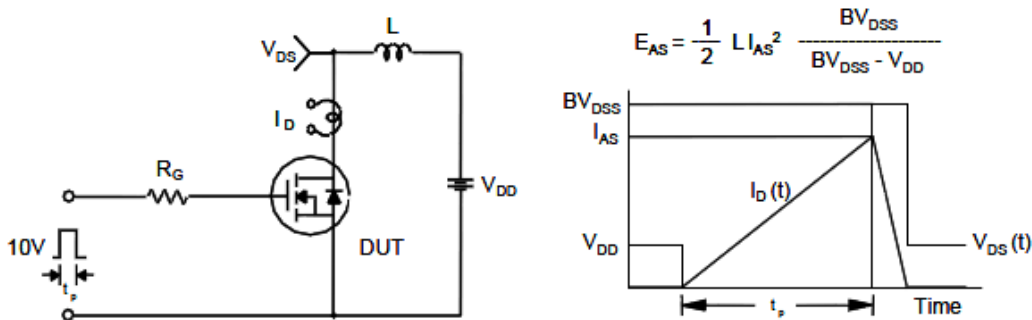
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



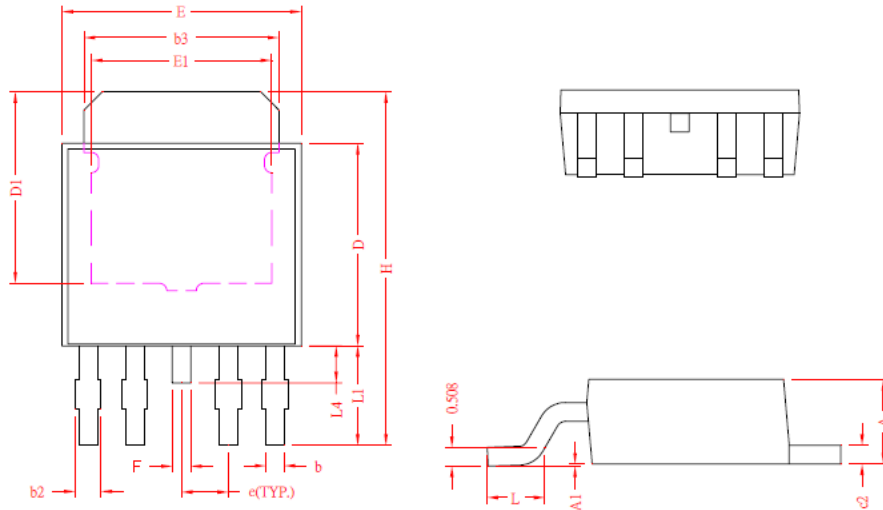
Unclamped Inductive Switching Test Circuit & Waveforms







**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

©2010 Alfa-MOS Technology Corp.  
 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  
 ©http://www.alfa-mos.com