GSM5604

40V N & P Pair Enhancement Mode MOSFET

Product Description

GSM5604, 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,$R_{DS(ON)}$=20mΩ@V_{GS}=10V
- 40V/12A,$R_{DS(ON)}$=30mΩ@V_{GS}=4.5V

P-Channel

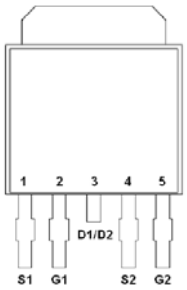
- -40V/-15A,$R_{DS(ON)}$=38mΩ@V_{GS}=-10V
- -40V/-12A,$R_{DS(ON)}$=54mΩ@V_{GS}=-4.5V

Applications

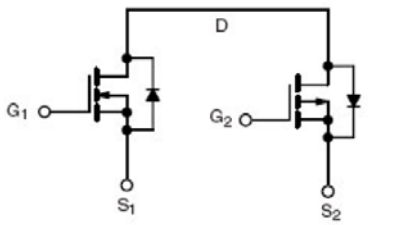
- DC/DC Conversion
- Load Switch
- DC FAN

Packages & Pin Assignments

GSM5604DF(TO-252-4L)

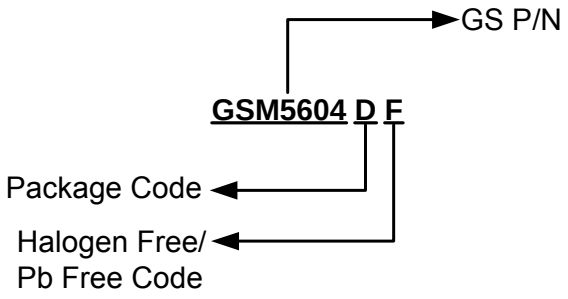


Pin	Description	Pin	Description
1	Source1	4	Source2
2	Gate1	5	Gate2
3	Drain 1/2		



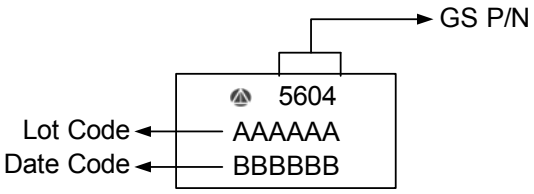
N-Channel MOSFET P-Channel MOSFET

Ordering Information



Part Number	Package	Quantity Reel
GSM5604DF	TO-252-4L	2500 PCS

Marking Information



Absolute Maximum Ratings (N-Channel)

(T_A=25ºC unless otherwise noted)

Symbol	Parameter		Typical	Unit
V_{DSS}	Drain-Source Voltage		40	V
V_{GSS}	Gate –Source Voltage		±20	V
I_D	Continuous Drain Current(T_J=150ºC)	T_A=25ºC	8.0	A
		T_A=70ºC	6.0	
I_{DM}	Pulsed Drain Current		20	A
I_S	Continuous Source Current(Diode Conduction)		1.5	A
P_D	Power Dissipation	T_A=25ºC	2.8	W
		T_A=70ºC	1.8	
T_J	Operating Junction Temperature		150	ºC
T_{STG}	Storage Temperature Range		-55/150	ºC
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		62.5	ºC/ W

Electrical Characteristics (N-Channel)

(T_A=25ºC unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V,I_D=250uA	40			V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250uA	1.0		3.0	
I_{GSS}	Gate Leakage Current	V_{DS}=0V,V_{GS}=±20V			±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=32V,V_{GS}=0V			1	uA
		V_{DS}=32V,V_{GS}=0V, T_J=85ºC			10	
$I_{D(on)}$	On-State Drain Current	V_{DS}≧5V,V_{GS}=10V	20			A
$R_{DS(on)}$	Drain-Source On-Resistance	V_{GS}=10V,I_D=15A		13	20	mΩ
		V_{GS}=4.5V,I_D=12A		18	30	
g_{FS}	Forward Transconductance	V_{DS}=15V,I_D=5.0A		25		S
V_{SD}	Diode Forward Voltage	I_S=2.0A,V_{GS}=0V		0.85	1.2	V
Dynamic						
C_{iss}	Input Capacitance	V_{DS}=20V, V_{GS}=0V,f=1MHz		850		pF
C_{oss}	Output Capacitance			110		
C_{rss}	Reverse Transfer Capacitance			75		
Q_g	Total Gate Charge	V_{DS}=20V, V_{GS}=4.5V,I_D=5.0A		10	14	nC
Q_{gs}	Gate-Source Charge			2.8		
Q_{gd}	Gate-Drain Charge			3.2		
$t_{d(on)}$	Turn-On Time	V_{DD}=20V, R_L=4Ω ,I_D=5.0A, V_{GEN}=10V,R_G=1Ω		6	12	ns
T_r				10	20	
$t_{d(off)}$	Turn-Off Time			20	36	
T_f				6	12	

Absolute Maximum Ratings (P-Channel)

(T_A=25ºC unless otherwise noted)

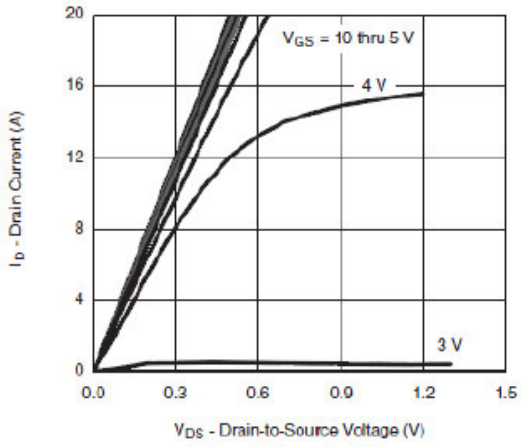
Symbol	Parameter		Typical	Unit
V_{DSS}	Drain-Source Voltage		-40	V
V_{GSS}	Gate-Source Voltage		±20	V
I_D	Continuous Drain Current(T_J=150ºC)	T_A=25ºC	-7.0	A
		T_A=70ºC	-6.0	
I_{DM}	Pulsed Drain Current		-30	A
I_S	Continuous Source Current(Diode Conduction)		-1.7	A
P_D	Power Dissipation	T_A=25ºC	2.8	W
		T_A=70ºC	1.8	
T_J	Operating Junction Temperature		150	ºC
T_{STG}	Storage Temperature Range		-55/150	ºC
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		62.5	ºC/ W

Electrical Characteristics (P-Channel)

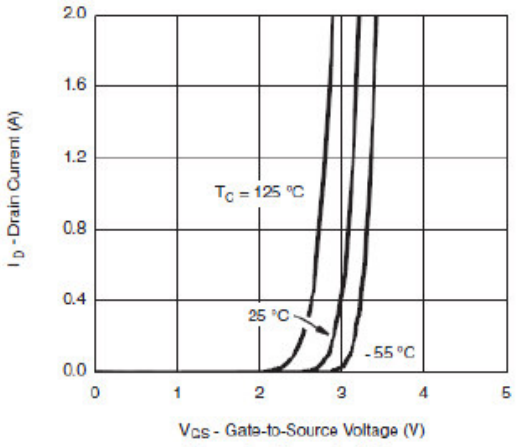
(T_A=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V,I_D=-250uA	-40			V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=-250uA	-1.0		-3.0	
I_{GSS}	Gate Leakage Current	V_{DS}=0V,V_{GS}=±20V			±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-32V,V_{GS}=0V			-1	uA
		V_{DS}=-32V,V_{GS}=0V, T_J=85°C			-20	
$I_{D(on)}$	On-State Drain Current	V_{DS}≦-5V,V_{GS}=-10V	-20			A
$R_{DS(on)}$	Drain-Source On-Resistance	V_{GS}=-10V,I_D=-15A		30	38	mΩ
		V_{GS}=-4.5V,I_D=-12A		44	54	
g_{FS}	Forward Transconductance	V_{DS}=-15V,I_D=-5A		20		S
V_{SD}	Diode Forward Voltage	I_S=-2A,V_{GS}=0V		-0.8	-1.2	V
Dynamic						
C_{iss}	Input Capacitance	V_{DS}=-20V, V_{GS}=0V,f=1MHz		1100		pF
C_{oss}	Output Capacitance			145		
C_{rss}	Reverse Transfer Capacitance			115		
Q_g	Total Gate Charge	V_{DS}=-20V, V_{GS}=-4.5V,I_D=-5.0A		13	20	nC
Q_{gs}	Gate-Source Charge			4.5		
Q_{gd}	Gate-Drain Charge			6.5		
$t_{d(on)}$	Turn-On Time	V_{DD}=-20V, R_L=4Ω ,I_D=-5.0A, V_{GEN}=-4.5V,R_G=1Ω		40	80	ns
T_r				55	100	
$t_{d(off)}$	Turn-Off Time			30	60	
T_f				12	20	

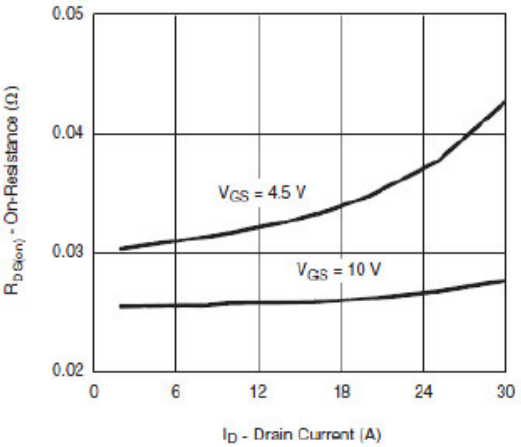
Typical Performance Characteristics (N-Channel)



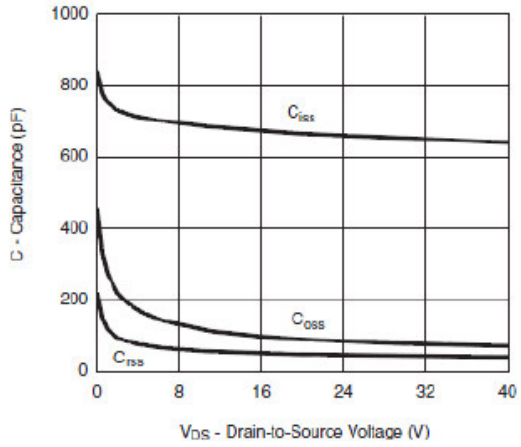
Output Characteristics



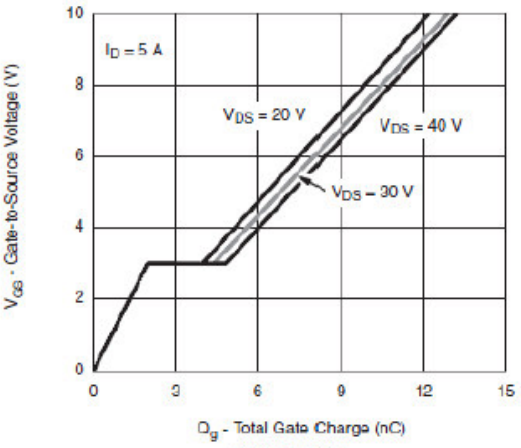
Transfer Characteristics



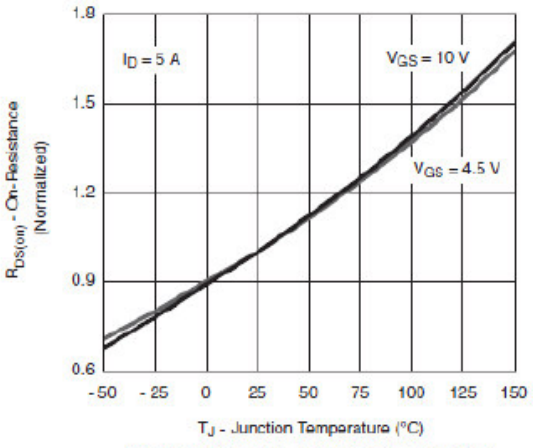
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

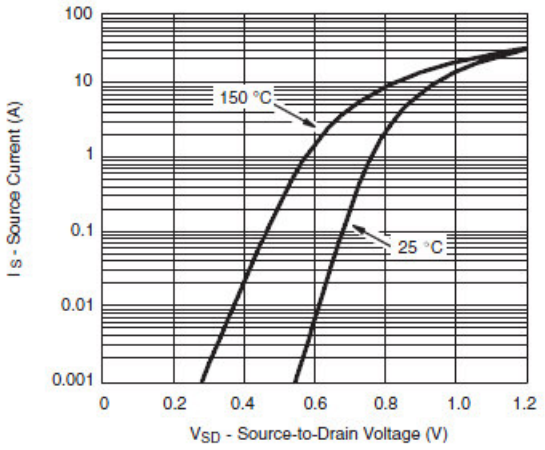


Gate Charge

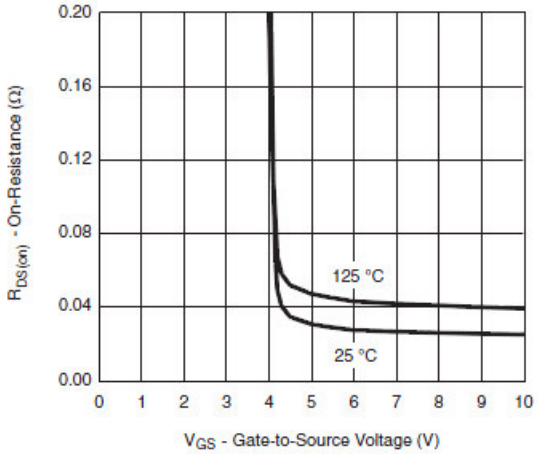


On-Resistance vs. Junction Temperature

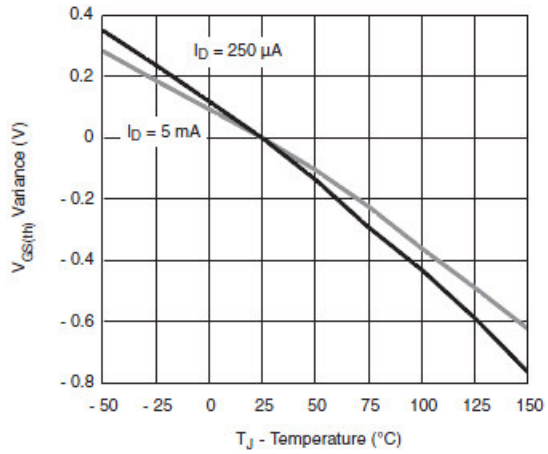
Typical Performance Characteristics (N-Channel)



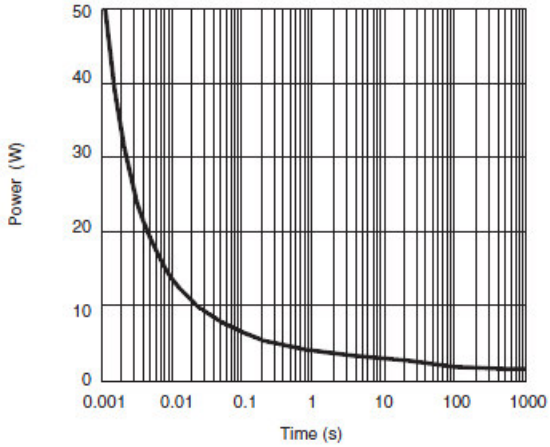
Source-Drain Diode Forward Voltage



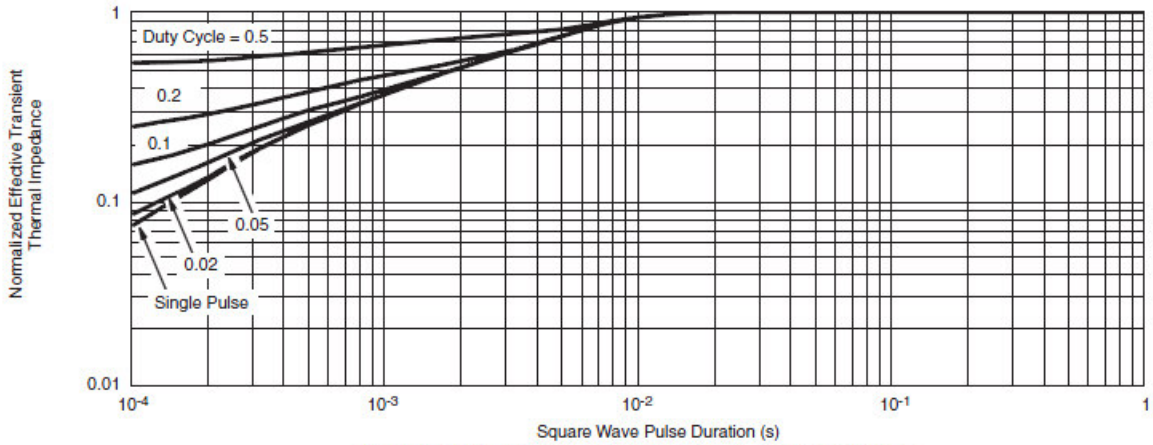
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

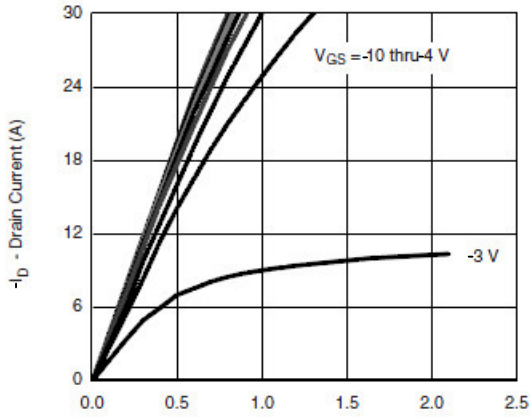


Single Pulse Power, Junction-to-Ambient

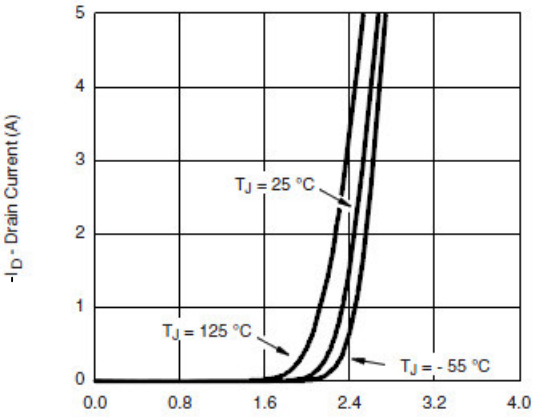


Normalized Thermal Transient Impedance, Junction-to-Case

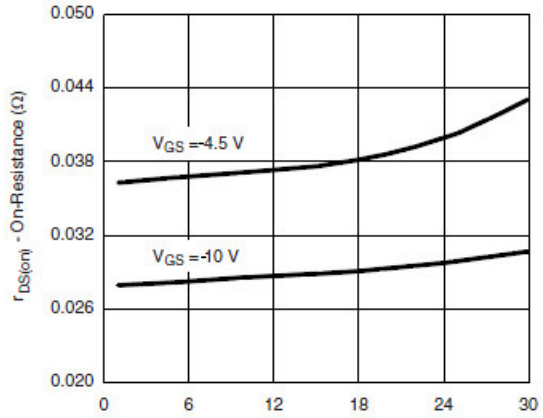
Typical Performance Characteristics (P-Channel)



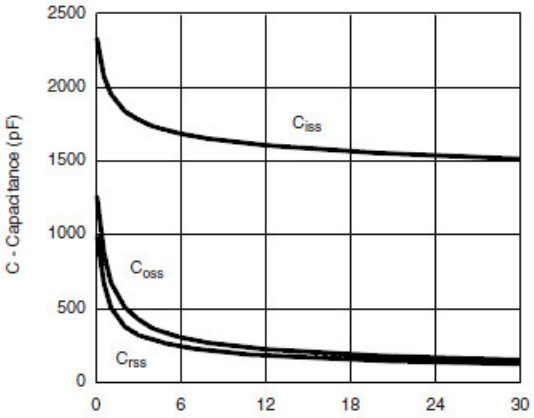
Output Characteristics



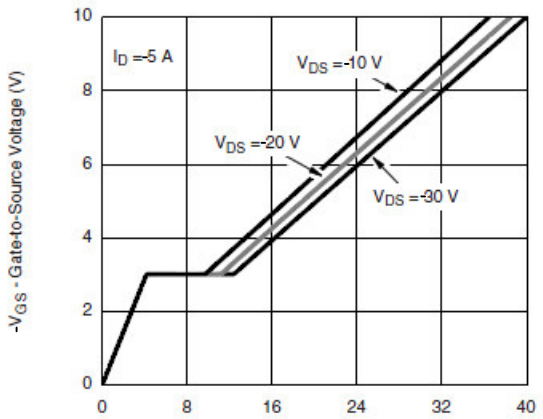
Transfer Characteristics



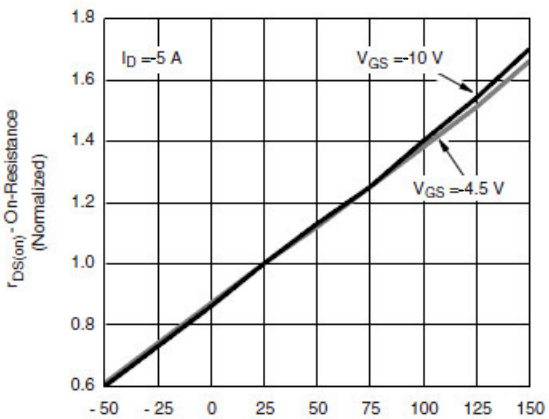
On-Resistance vs. Drain Current



Capacitance

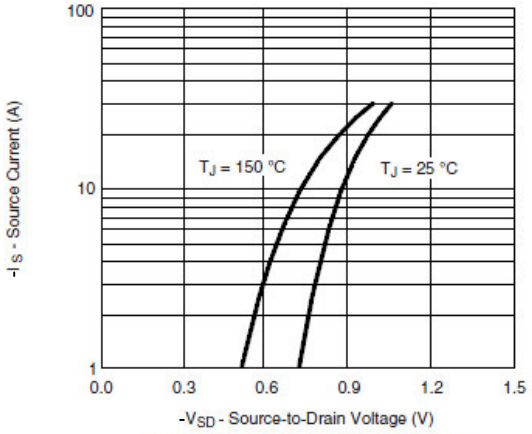


Gate Charge

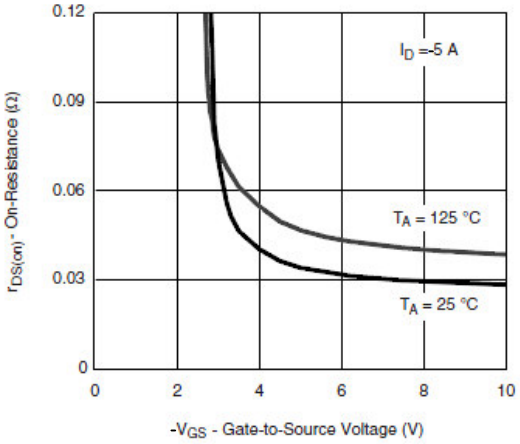


On-Resistance vs. Junction Temperature

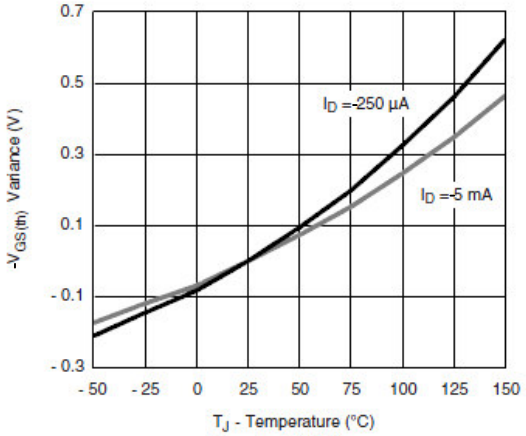
Typical Performance Characteristics (P-Channel)



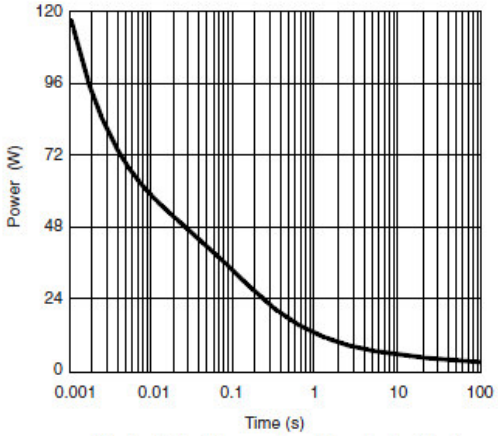
Source-Drain Diode Forward Voltage



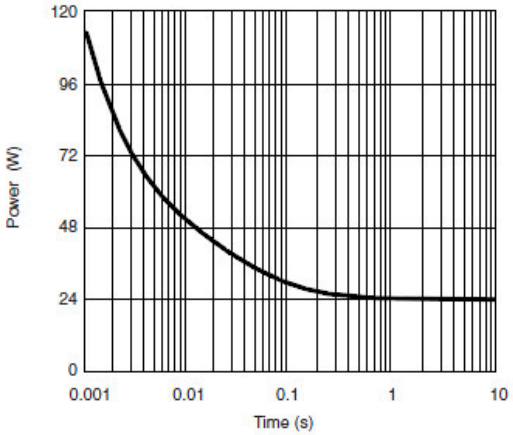
On-Resistance vs. Gate-to-Source Voltage



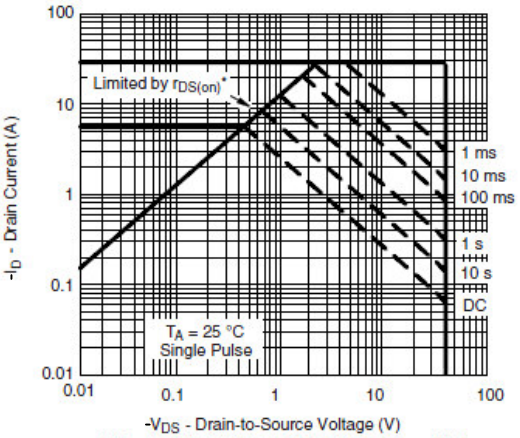
Threshold Voltage



Single Pulse Power, Junction-to-Ambient



Single Pulse Power, Junction-to-Case

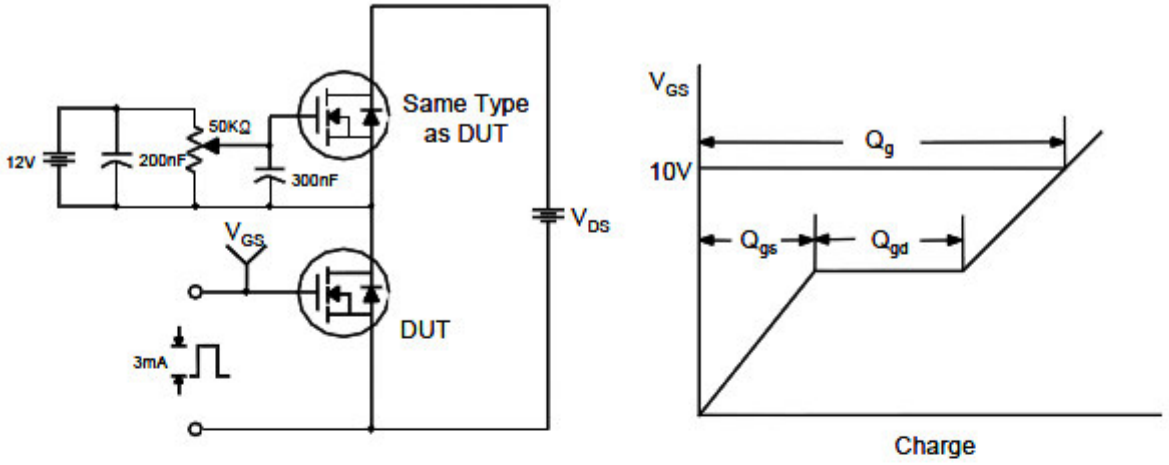


* V_{GS} > minimum V_{GS} at which $r_{DS(on)}$ is specified

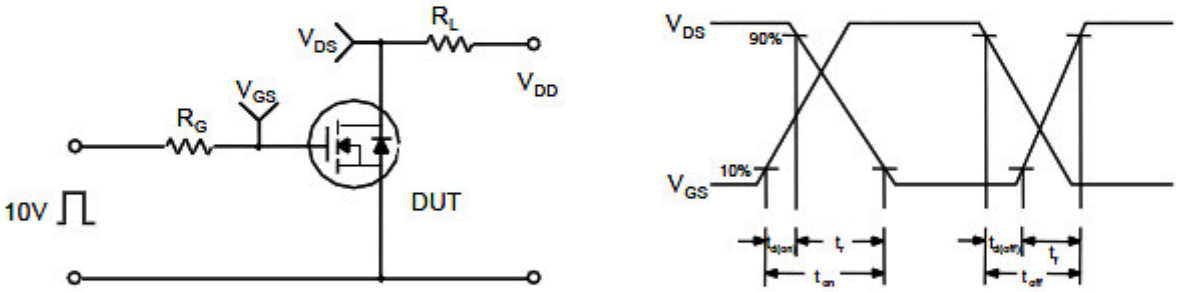
Safe Operating Area, Junction-to-Ambient

Typical Performance Characteristics

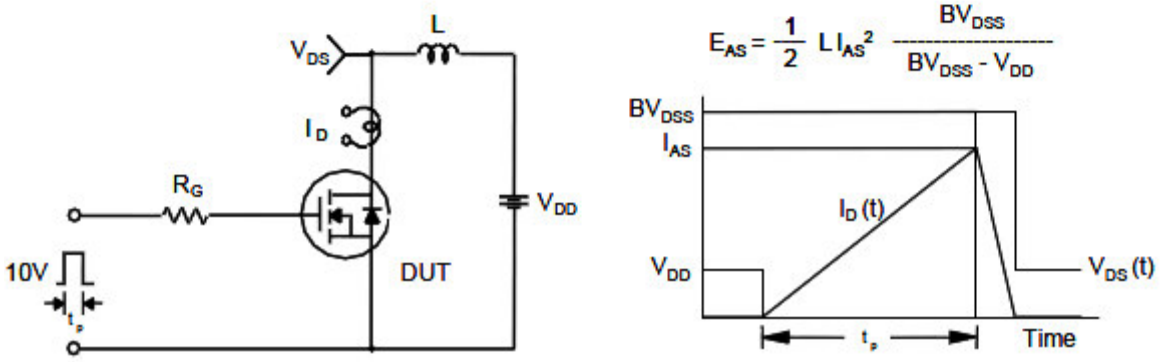
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

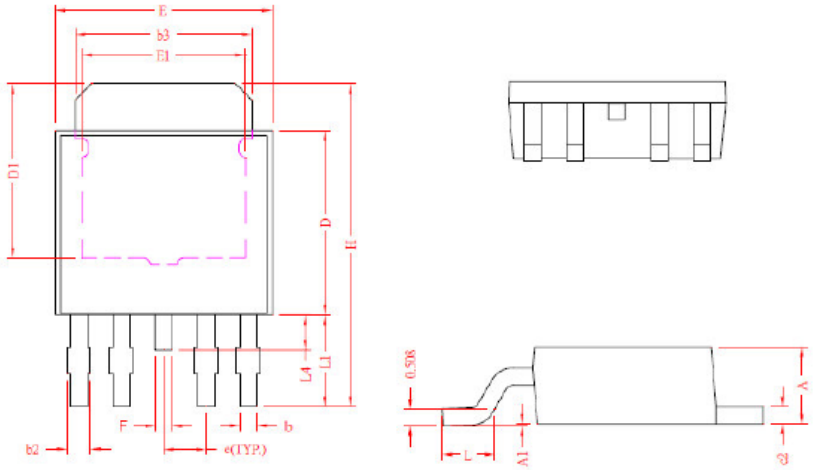


Unclamped Inductive Switching Test Circuit & Waveforms



Package Dimension

TO-252-4L PLASTIC PACKAGE



Dimensions				
SYMBOL	Millimeters		Inches	
	MIN	MAX	MIN	MAX
A	2.20	2.40	0.086	0.094
A1	0	0.15	0	0.005
b	0.40	0.60	0.015	0.023
b2	0.50	0.80	0.019	0.031
b3	5.20	5.50	0.204	0.216
c2	0.45	0.55	0.017	0.021
D	5.40	5.80	0.212	0.228
D1	4.57	-	0.179	-
E	6.40	6.80	0.251	0.267
E1	3.81	-	0.150	-
e	1.27 (REF)		0.05 (REF)	
F	0.40	0.60	0.015	0.023
H	9.40	10.20	0.370	0.401
L	1.40	1.77	0.055	0.069
L1	2.40	3.00	0.094	0.118
L4	0.80	1.20	0.031	0.047

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