GSM6601

30V N & P Pair Enhancement Mode MOSFET

Product Description

GSM6601, 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

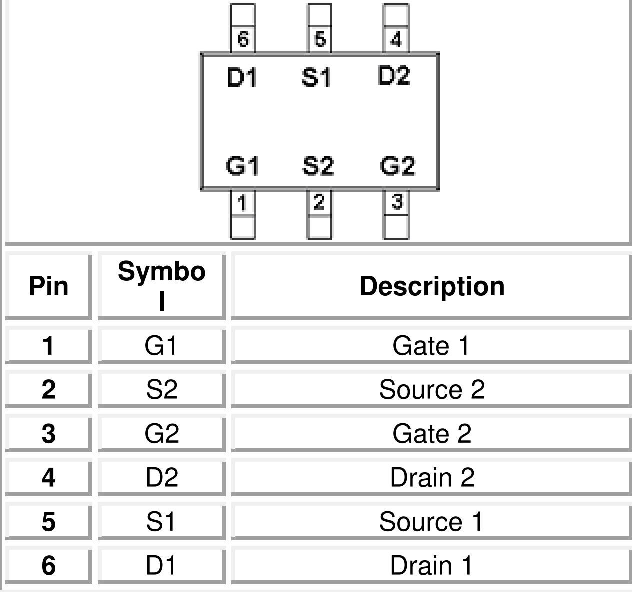
- N-Channel
  30V/3.4A,$R_{DS(ON)}$=65mΩ@V_{GS}=10V
  30V/3.0A,$R_{DS(ON)}$=75mΩ@V_{GS}=4.5V
  30V/2.0A,$R_{DS(ON)}$=95mΩ@V_{GS}=2.5V
- P-Channel
  -30V/-2.6A,$R_{DS(ON)}$=120mΩ@V_{GS}=-10V
  -30V/-2.0A,$R_{DS(ON)}$=150mΩ@V_{GS}=-4.5V
  -30V/-1.2A,$R_{DS(ON)}$=250mΩ@V_{GS}=-2.5V
- Super high density cell design for extremely low $R_{DS\ (ON)}$
- Exceptional on-resistance and maximum DC current capability
- TSOP-6 package design

Applications

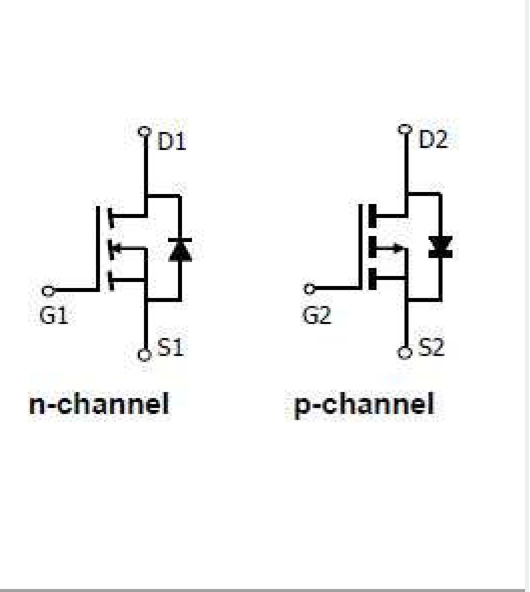
- Power Management in Note book
- Portable Equipment
- Battery Powered System
- DC/DC Converter
- Load Switch
- DSC
- LCD Display inverter

Packages & Pin Assignments

GSM6601TSF (TSOP-6)

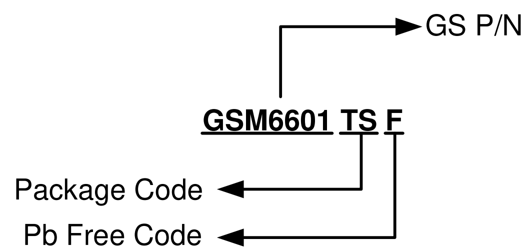


Pin	Symbol	Description
1	G1	Gate 1
2	S2	Source 2
3	G2	Gate 2
4	D2	Drain 2
5	S1	Source 1
6	D1	Drain 1



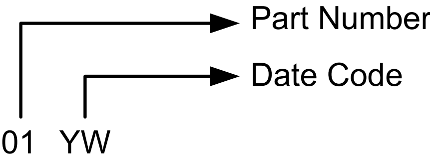
GSM6601

Ordering Information



Part Number	Package	Quantity Reel
GSM6601TSF	TSOP-6	3000 PCS

Marking Information



Absolute Maximum Ratings

T_A=25ºC Unless otherwise noted

Symbol	Parameter		Typical N-Channel	Typical P-Channel	Unit
V_{DSS}	Drain-Source Voltage		30	-30	V
V_{GSS}	Gate –Source Voltage		±12	±12	V
I_D	Continuous Drain Current(T_J=150℃)	T_A=25℃	3.5	-2.6	A
		T_A=70℃	2.9	-2.1	A
I_{DM}	Pulsed Drain Current		15	-15	A
I_S	Continuous Source Current (Diode Conduction)		1.5	-1.5	A
P_D	Power Dissipation	T_A=25℃	1.25		W
		T_A=70℃	0.8		W
T_J	Operating Junction Temperature		-55/150		℃
T_{STG}	Storage Temperature Range		-55/150		℃
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		110		℃/W
$R_{\theta JC}$	Thermal Resistance-Junction to Case		60		℃/W

Electrical Characteristics (N-Channel)

(T_A=25ºC unless otherwise noted)

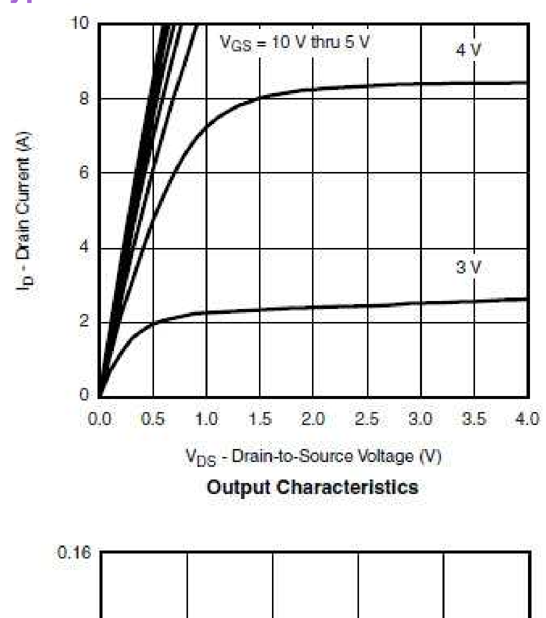
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V,I_D=250uA	30			V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250uA	0.3		1.0	V
I_{GSS}	Gate Leakage Current	V_{DS}=0V,V_{GS}=±12V			±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=24V,V_{GS}=0V			1	uA
		V_{DS}=24V,V_{GS}=0V, T_J=85ºC			30	uA
$I_{D(on)}$	On-State Drain Current	V_{DS}≧5V,V_{GS}=4.5V	30			A
$R_{DS(on)}$	Drain-Source On-Resistance	V_{GS}=10V,I_D=3.4A		55	65	mΩ
		V_{GS}=4.5V,I_D=3.0A		62	75	mΩ
		V_{GS}=2.5V,I_D=1.2A		76	95	mΩ
g_{FS}	Forward Transconductance	V_{DS}=10V,I_D=1.6A		20		S
V_{SD}	Diode Forward Voltage	I_S=1.7A,V_{GS}=0V		0.8	1.2	V
Dynamic						
C_{iss}	Input Capacitance	V_{DS}=15V, V_{GS}=0V,f=1MHz		280		pF
C_{oss}	Output Capacitance			40		pF
C_{rss}	Reverse Transfer Capacitance			20		pF
Q_g	Total Gate Charge	V_{DS}=15V, V_{GS}=4.5V,I_D=3.6A		5.0		nC
Q_{gs}	Gate-Source Charge			1.0		nC
Q_{gd}	Gate-Drain Charge			0.6		nC
$t_{d(on)}$	Turn-On Time	V_{DD}=15V, R_L=15Ω ,I_D=1.0A, V_{GEN}=10V,R_G=6Ω		10	15	ns
T_r				12	20	ns
$t_{d(off)}$	Turn-Off Time			15	25	ns
T_f				10	15	ns

Electrical Characteristics (P-Channel)

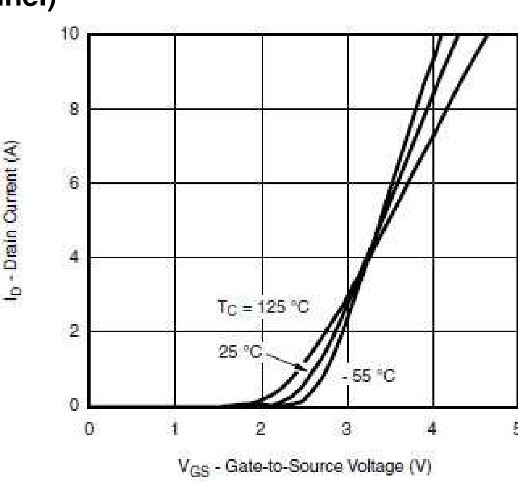
(T_A=25ºC unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V,I_D=-250uA	-30			V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=-250uA	-0.6		-1.4	V
I_{GSS}	Gate Leakage Current	V_{DS}=0V,V_{GS}=±12V			±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-24V,V_{GS}=0V			-1	uA
		V_{DS}=-24V,V_{GS}=0V, T_J=85ºC			-30	uA
$I_{D(on)}$	On-State Drain Current	V_{DS}≦-5V,V_{GS}=-10V	-10			A
$R_{DS(on)}$	Drain-Source On-Resistance	V_{GS}=-10.0V,I_D=-2.6A		95	120	mΩ
		V_{GS}=-4.5V,I_D=-2.0A		125	150	mΩ
		V_{GS}=-2.5V,I_D=-1.2A		195	250	mΩ
g_{FS}	Forward Transconductance	V_{DS}=-5V,I_D=-4.0A		10		S
V_{SD}	Diode Forward Voltage	I_S=-1.7A,V_{GS}=0V		-0.7	-1.3	V
Dynamic						
C_{iss}	Input Capacitance	V_{DS}=-15V, V_{GS}=0V,F=1MHz		230		pF
C_{oss}	Output Capacitance			40		pF
C_{rss}	Reverse Transfer Capacitance			25		pF
Q_g	Total Gate Charge	V_{DS}=-15V, V_{GS}=-4.5V,I_D=-2.0A		4		nC
Q_{gs}	Gate-Source Charge			0.6		nC
Q_{gd}	Gate-Drain Charge			1.5		nC
$t_{d(on)}$	Turn-On Time	V_{DD}=-15V, R_L=15Ω ,I_D=-1.0A, V_{GEN}=-10V,R_G=6Ω		5	10	ns
T_r				8	15	ns
$t_{d(off)}$	Turn-Off Time			15	30	ns
T_f				15	30	ns

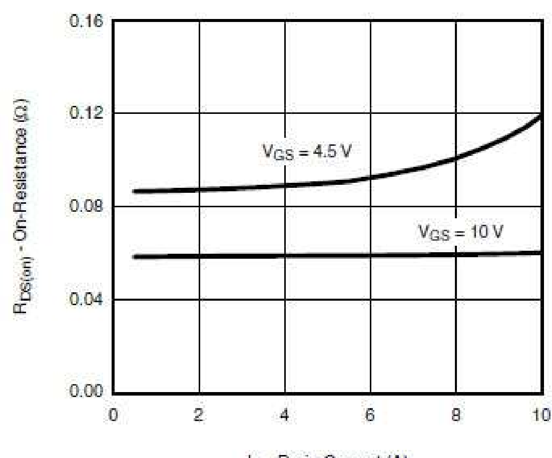
Typical Performance Characteristics (N-Channel)



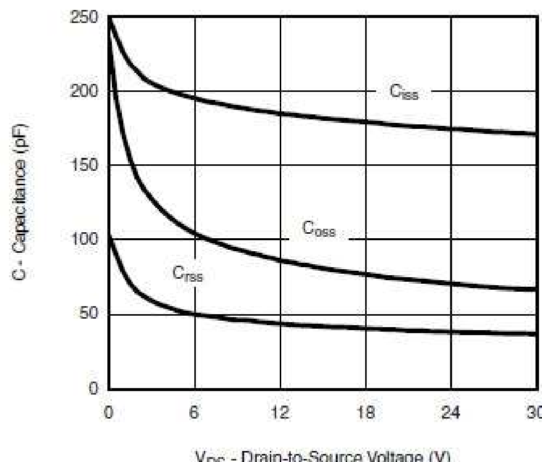
Output Characteristics



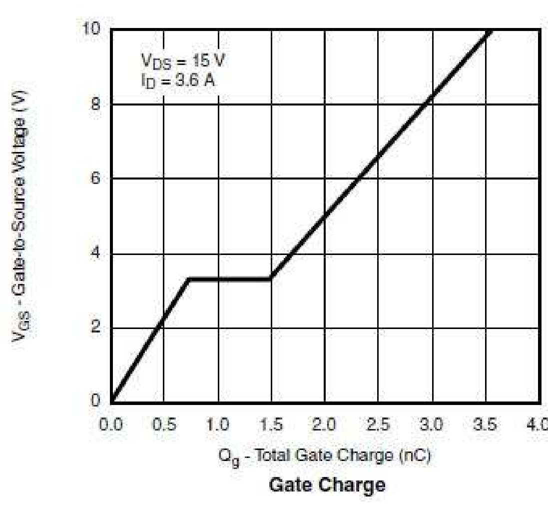
Transfer Characteristics



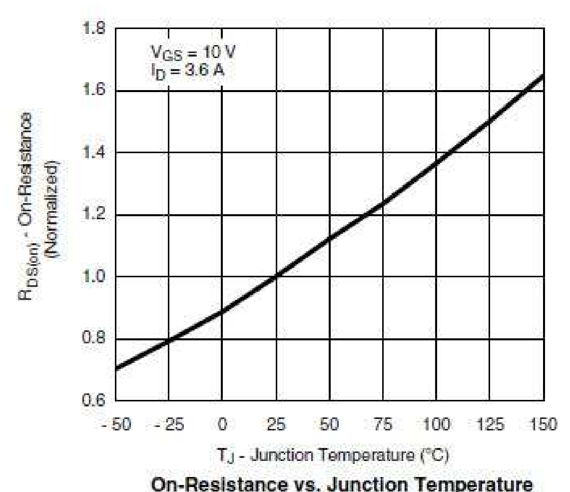
On-Resistance vs. Drain Current



Capacitance



Gate Charge



On-Resistance vs. Junction Temperature

Typical Performance Characteristics **(N-Channel Continue)**

I_S - Source Current (A)

V_{SD} - Source-to-Drain Voltage (V)

T_J = 150 °C

T_J = 25 °C

Source-Drain Diode Forward Voltage

$R_{DS(on)}$ - On-Resistance (Ω)

V_{GS} - Gate-to-Source Voltage (V)

I_D = 1 A

I_D = 3.6 A

On-Resistance vs. Gate-to-Source Voltage

$V_{GS(th)}$ Variance (V)

T_J - Temperature (°C)

I_D = 250 μA

Threshold Voltage

Power (W)

Time (s)

Single Pulse Power

Normalized Effective Transient Thermal Impedance

Square Wave Pulse Duration (s)

Duty Cycle = 0.5

0.2

0.1

0.05

0.02

Single Pulse

Notes:

P_{DM}

t_1

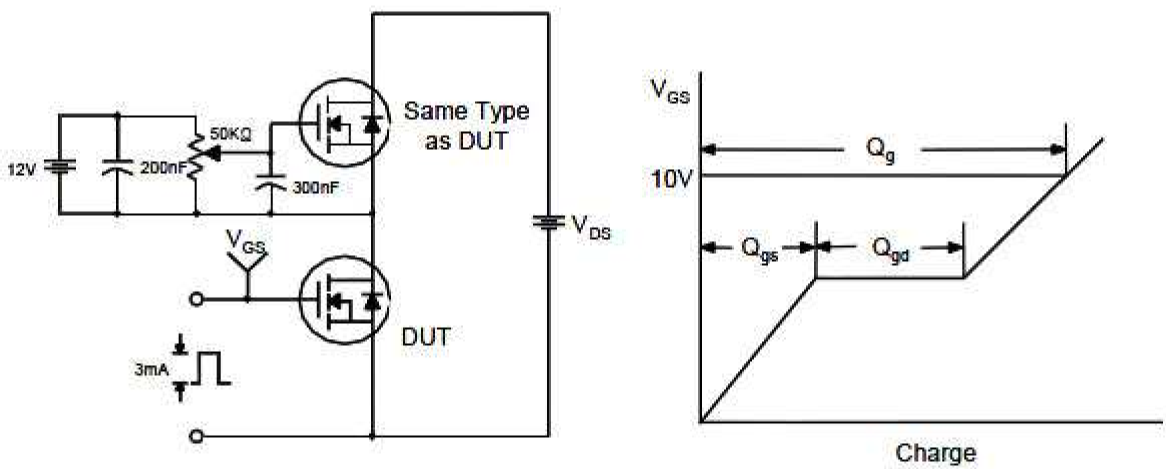
t_2

1. Duty Cycle, D = $\frac{t_1}{t_2}$
2. Per Unit Base = R_{thJA} = 100 °C/W
3. $T_{JM} - T_A = P_{DM}Z_{thJA}^{(t)}$
4. Surface Mounted

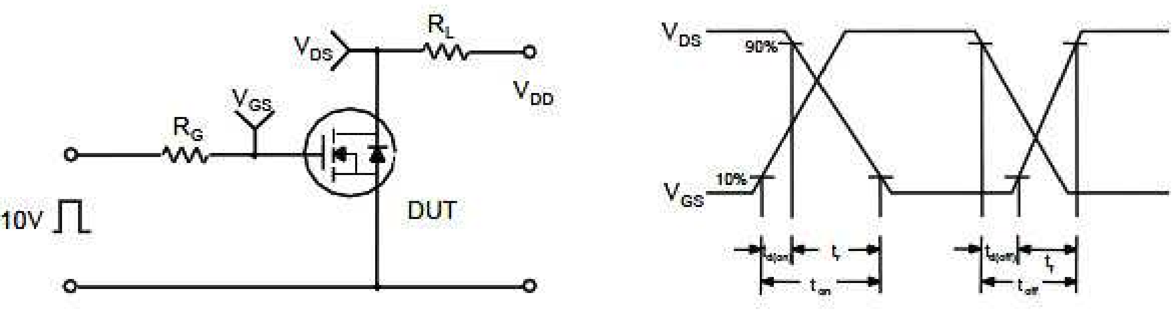
Normalized Thermal Transient Impedance, Junction-to-Ambient

Typical Performance Characteristics (N-Channel Continue)

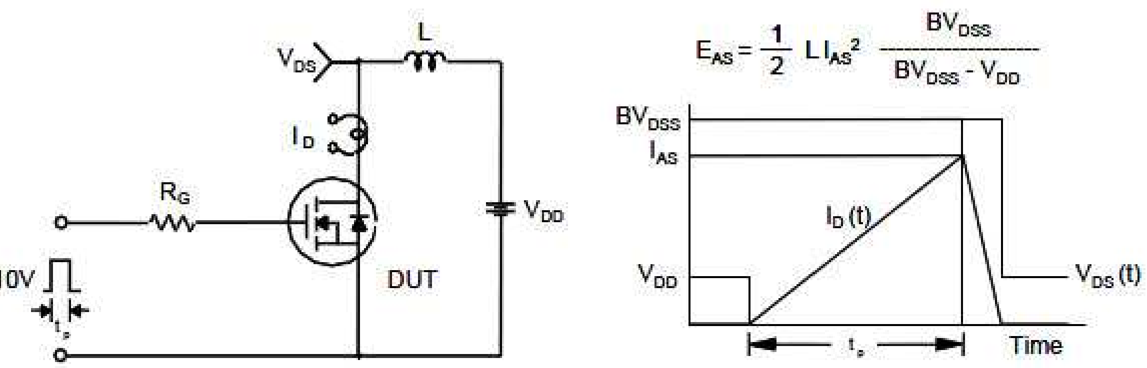
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Typical Performance Characteristics (P-Channel)

V_{GS} = -5 V thru -3.5 V
-3 V
-2.5 V
-2 V
-1.5 V

$-I_D$ - Drain Current (A)

$-V_{DS}$ - Drain-to-Source Voltage (V)

Output Characteristics

T_C = - 55 °C
25 °C
125 °C

$-I_D$ - Drain Current (A)

$-V_{GS}$ - Gate-to-Source Voltage (V)

Transfer Characteristics

V_{GS} = -2.5 V
V_{GS} = -4.5 V

$R_{DS(on)}$ - On-Resistance (Ω)

$-I_D$ - Drain Current (A)

On-Resistance vs. Drain Current

C_{iss}
C_{oss}
C_{rss}

C - Capacitance (pF)

$-V_{DS}$ - Drain-to-Source Voltage (V)

Capacitance

V_{DS} = -15 V
I_D = -2 A

$-V_{GS}$ - Gate-to-Source Voltage (V)

Q_g - Total Gate Charge (nC)

Gate Charge

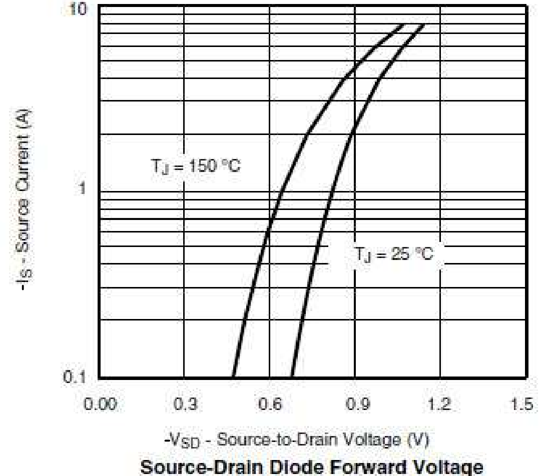
V_{GS} = -4.5 V
I_D = -2 A

$R_{DS(on)}$ - On-Resistance (Normalized)

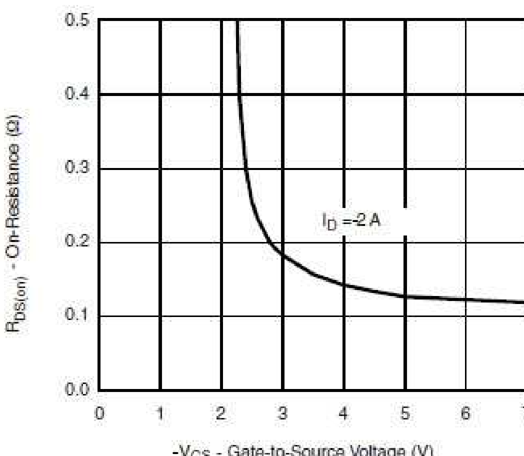
T_J - Junction Temperature (°C)

On-Resistance vs. Junction Temperature

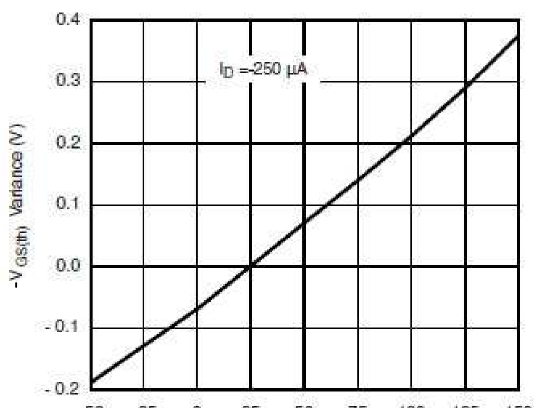
Typical Performance Characteristics (P-Channel Continue)



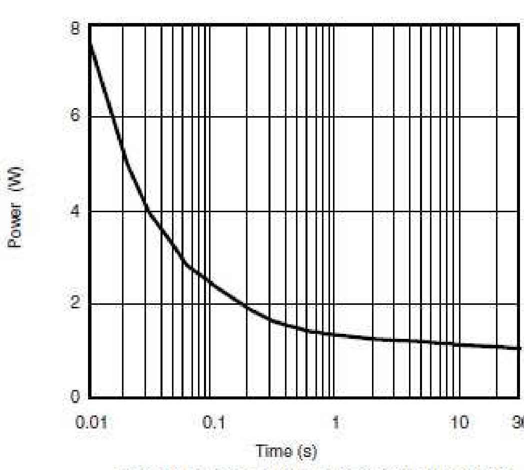
Source-Drain Diode Forward Voltage



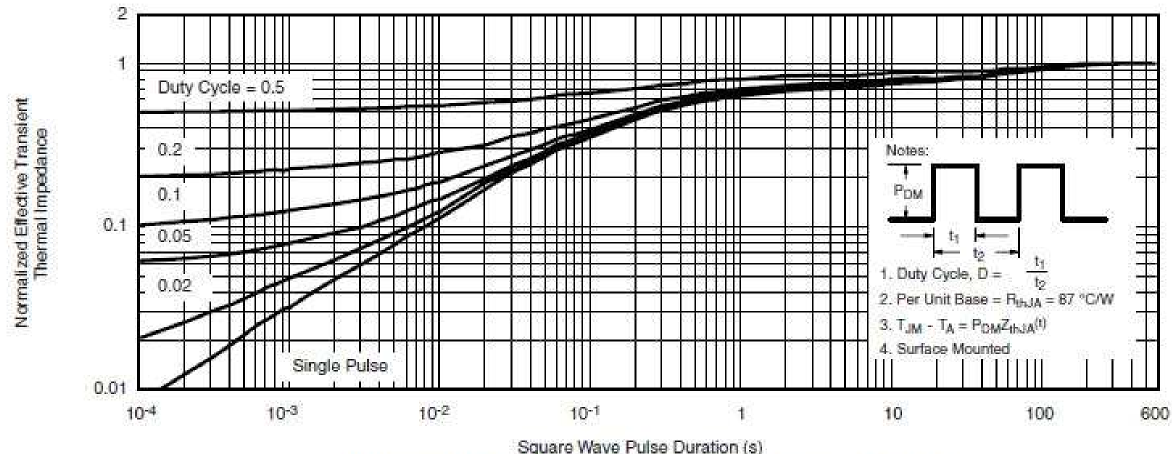
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



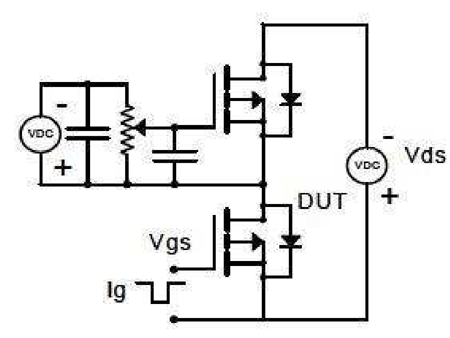
Single Pulse Power, Junction-to-Ambient

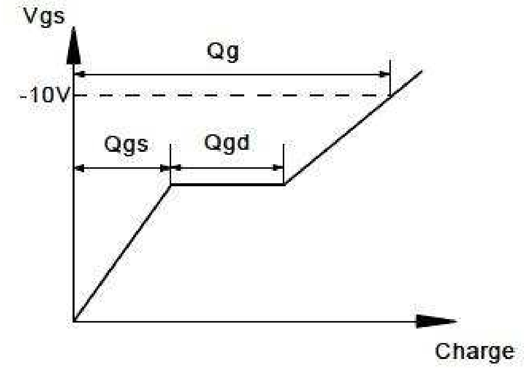


Normalized Thermal Transient Impedance, Junction-to-Ambient

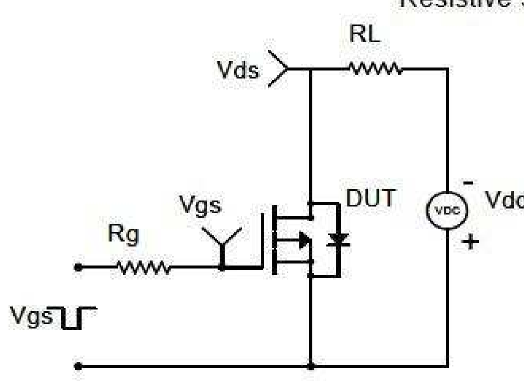
Typical Performance Characteristics (P-Channel Continue)

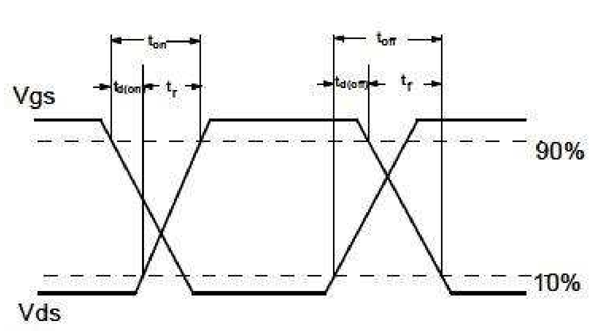
Gate Charge Test Circuit & Waveform



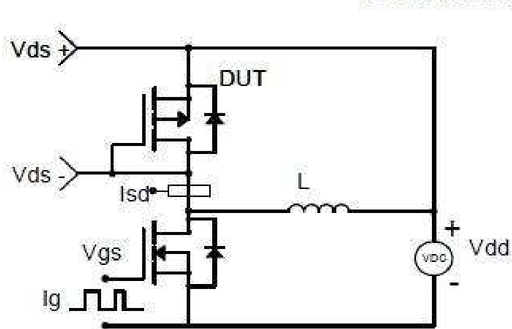


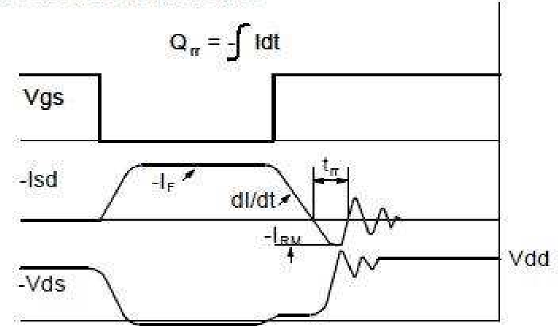
Resistive Switching Test Circuit & Waveforms





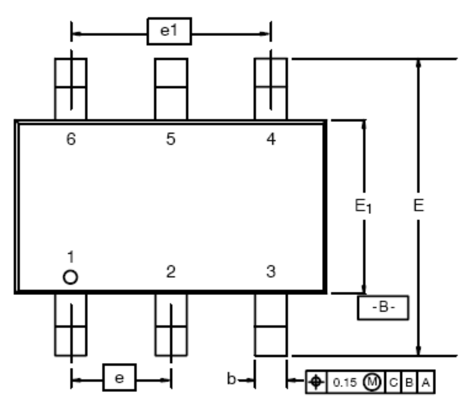
Diode Recovery Test Circuit & Waveforms

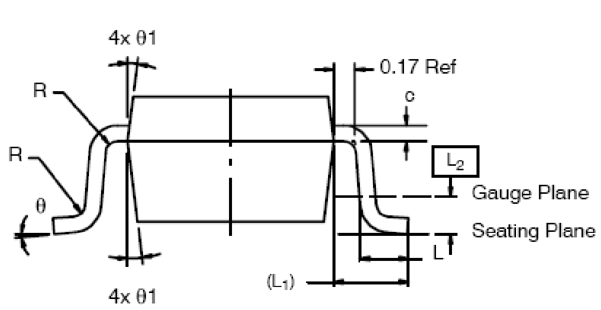




Package Dimension

TSOP-6 PLASTIC PACKAGE





Dimensions						
SYMBOL	Millimeters			Inches		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.91	-	1.10	0.036	-	0.043
A_1	0.01	-	0.10	0.0004	-	0.004
A_2	0.90	-	1.00	0.035	0.038	0.039
b	0.30	0.32	0.45	0.012	0.013	0.018
c	0.10	0.15	0.20	0.004	0.006	0.008
D	2.95	3.05	3.10	0.116	0.120	0.122
E	2.70	2.85	2.98	0.106	0.112	0.117
E1	1.55	1.65	1.70	0.061	0.065	0.067
e	1.00 BSC			0.0394 BSC		
e_1	1.90	2.00	2.10	0.075	0.080	0.085
L	0.35	-	0.50	0.014	-	0.020
L_1	0.60 Ref			0.024 Ref		
L_2	0.25 BSC			0.010 BSC		
R	0.10	-	-	0.004	-	-
θ	0º	4º	8º	0º	4º	8º
$θ_1$	7º Nom			7º Nom		

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