GSM1304

20V N-Channel Enhancement Mode MOSFET

Product Description

GSM1304, N-Channel 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, such as smart phone and notebook computer and other battery powered circuits, and low in-line power loss are needed in commercial industrial surface mount applications.

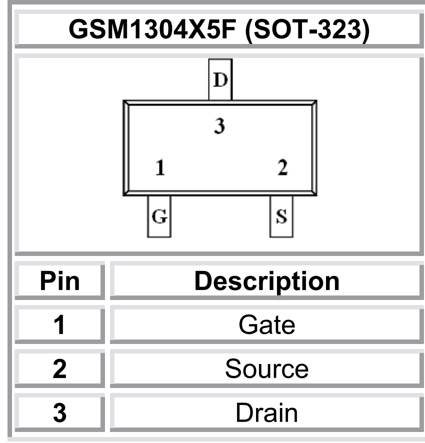
Features

- 20V/1.8A , $R_{DS(ON)}$= 280mΩ@V_{GS}=4.5V
- 20V/1.5A , $R_{DS(ON)}$= 340mΩ@V_{GS}=2.5V
- 20V/1.2A , $R_{DS(ON)}$= 680mΩ@V_{GS}=1.8V
- Super high density cell design for extremely low $R_{DS\ (ON)}$
- Exceptional on-resistance and maximum DC current capability
- SOT-323(SC-70) package design

Applications

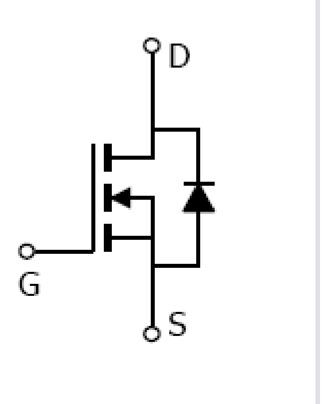
- Net Working System
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories
- Battery Operated Systems
- Power Supply Converter Circuits
- Load/Power Switching Smart Phones, Pagers

Packages & Pin Assignments

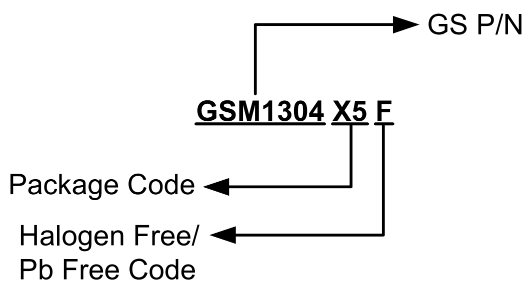


GSM1304X5F (SOT-323)

Pin	Description
1	Gate
2	Source
3	Drain

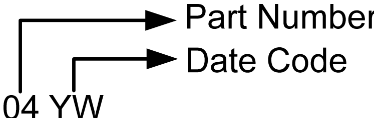


Ordering Information



Part Number	Package	Quantity
GSM1304X5F	SOT-323	3000 PCS

Marking Information



Absolute Maximum Ratings

T_A=25ºC Unless otherwise noted

Symbol	Parameter		Typical	Unit
V_{DSS}	Drain-Source Voltage		20	V
V_{GSS}	Gate-Source Voltage		±12	V
I_D	Continuous Drain Current(T_J=150℃)	T_A=25ºC	1.0	A
		T_A=70ºC	0.6	
I_{DM}	Pulsed Drain Current		6	A
I_S	Continuous Source Current(Diode Conduction)		1	A
P_D	Power Dissipation	T_A=25ºC	0.35	W
		T_A=70ºC	0.22	
T_J	Operating Junction Temperature		150	ºC
T_{STG}	Storage Temperature Range		-55/150	ºC
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		120	ºC/ W

Electrical Characteristics

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	20			V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250uA	0.4		1.0	
I_{GSS}	Gate Leakage Current	V_{DS}=0V,V_{GS}=±12V			±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}= 20V,V_{GS}=0V			1	uA
		V_{DS}= 20V, V_{GS}=0V,T_J=85ºC			5	
$I_{D(on)}$	On-State Drain Current	V_{DS}≧5V,V_{GS}=4.5V	1.0			A
$R_{DS(on)}$	Drain-Source On-Resistance	V_{GS}=4.5V,I_D=1.8A		240	280	mΩ
		V_{GS}=2.5V,I_D=1.5A		300	340	
		V_{GS}=1.8V,I_D=1.2A		600	680	
g_{fs}	Forward Transconductance	V_{DS}=10V,I_D=1.0A		1		S
V_{SD}	Diode Forward Voltage	I_S=1.0A,V_{GS}=0V		0.65	1.2	V
Dynamic						
C_{iss}	Input Capacitance	V_{DS}=10V, V_{GS}=0V,f=1MHz		70		pF
C_{oss}	Output Capacitance			20		
C_{rss}	Reverse Transfer Capacitance			8		
Q_g	Total Gate Charge	V_{DS}=10V, V_{GS}=4.5V, I_D=1.2A		1.06	1.38	nC
Q_{gs}	Gate-Source Charge			0.18		
Q_{gd}	Gate-Drain Charge			0.32		
$t_{d(on)}$	Turn-On Time	V_{DD}=10V, R_L=20Ω ,I_D=1.2A, V_{GEN}=4.5V,R_G=1Ω		18	26	ns
t_r				20	28	
$t_{d(off)}$	Turn-Off Time			70	110	
t_f				25	40	

Typical Performance Characteristics

I_D - Drain Current (A)

V_{GS} = 5 V thru 2 V

V_{GS} = 1.5 V

V_{GS} = 1.0 V

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

Output Characteristics

I_D - Drain Current (A)

T_J = 25 °C

T_J = 125 °C

T_J = - 55 °C

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

Transfer Characteristics

$R_{DS(on)}$ - D to S On-Resistance (Ω)

V_{GS} = 1.8 V

V_{GS} = 2.5 V

V_{GS} = 4.5 V

I_D - Drain Current (A)

On-Resistance vs. Drain Current

C - Capacitance (pF)

C_{iss}

C_{oss}

C_{rss}

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

Capacitance

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

I_D = 0.606 A

V_{DS} = 10 V

V_{DS} = 16 V

Q_g - Total Gate Charge (nC)

Gate Charge

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

V_{GS} = 4.5 V, I_D = 0.606 A

V_{GS} = 2.5 V, I_D = 0.505 A

V_{GS} = 1.8 V, I_D = 0.15 A

T_J - Junction Temperature (°C)

On-Resistance vs. Junction Temperature

Typical Performance Characteristics (continue)

T_J = 150 °C
T_J = 25 °C

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

I_S - Source Current (A)

Source-Drain Diode Forward Voltage

I_D = 0.606 A
T_A = 125 °C
T_A = 25 °C

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

$R_{DS(on)}$ - On-Resistance (Ω)

$R_{DS(on)}$ vs. V_{GS} vs Temperature

I_D = 250 µA

T_J - Temperature (°C)

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

Threshold Voltage

Limited by $R_{DS(on)}$*
1 ms
10 ms
100 ms
1 s
10 s
DC
T_A = 25 °C
Single Pulse

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

I_D - Drain Current (A)

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

Safe Operating Area, Junction-to-Ambient

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} = 540 °C/W
3. $T_{JM} - T_A = P_{DM}Z_{thJA}^{(t)}$
4. Surface Mounted

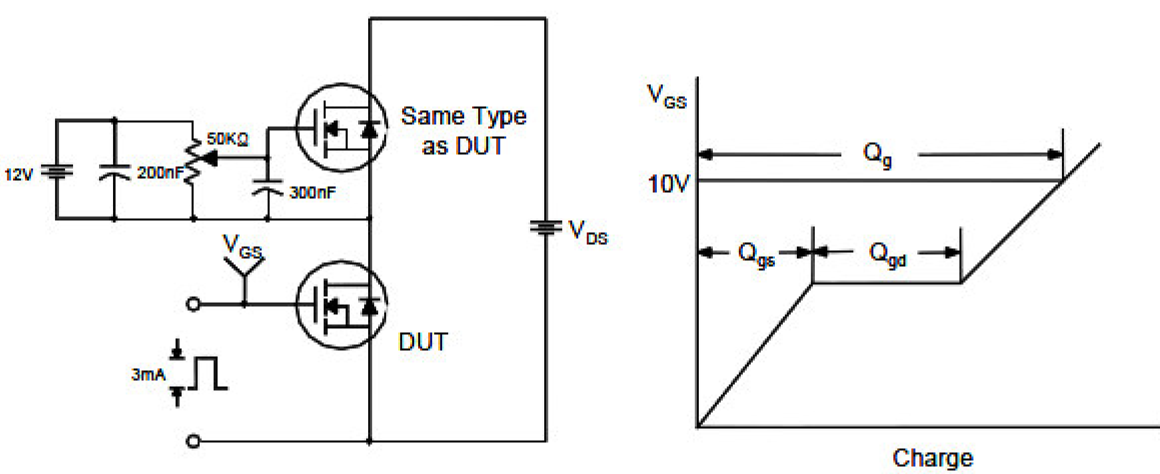
Square Wave Pulse Duration (s)

Normalized Effective Transient Thermal Impedance

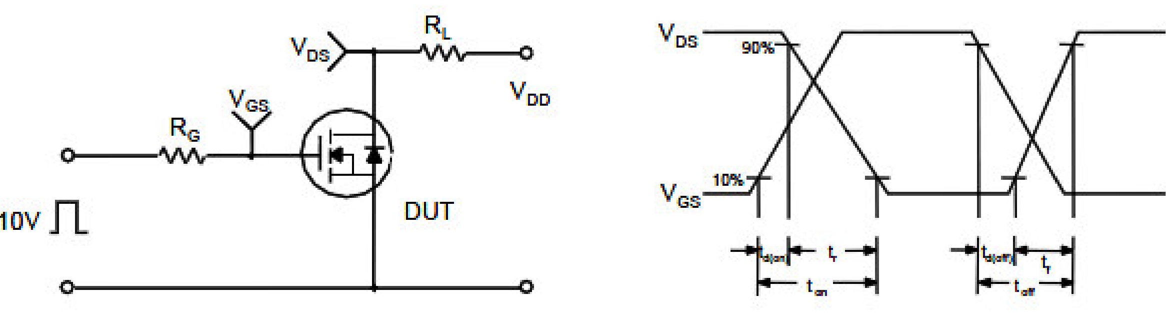
Normalized Thermal Transient Impedance, Junction-to-Ambient

Typical Characteristics

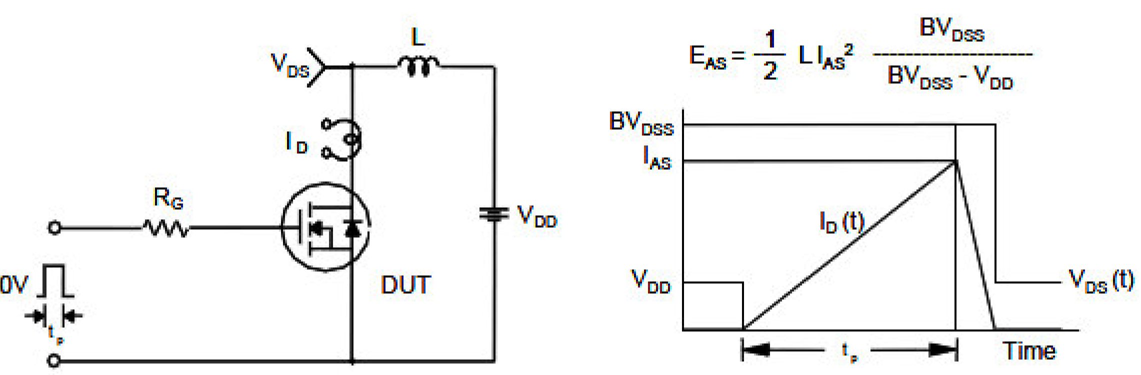
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



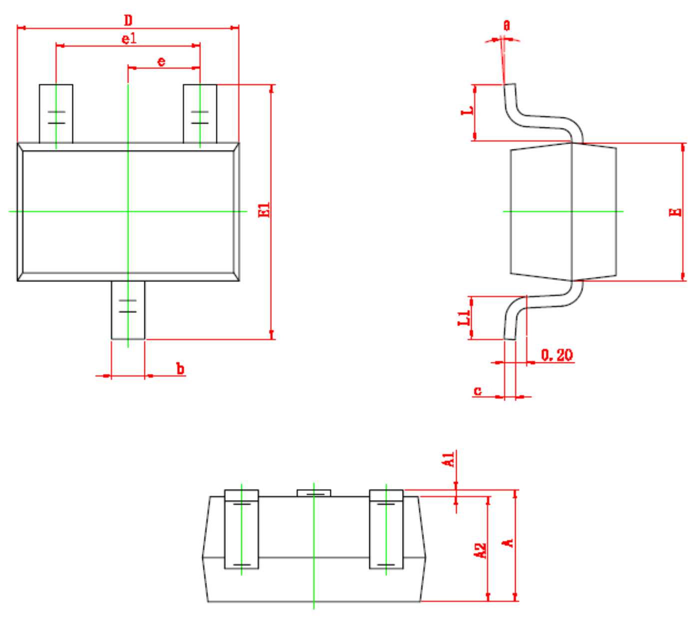
Unclamped Inductive Switching Test Circuit & Waveforms



GSM1304

Package Dimension

SOT-323 PLASTIC PACKAGE



Dimensions				
Symbol	**Millimeters**		**Inches**	
	Min	**Max**	**Min**	**Max**
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.200	0.400	0.008	0.016
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0º	8º	0º	8º

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