

Main Product Characteristics

V_{DS}	800V
$R_{DS(ON)}$	1000m Ω (Typ)
I_D	5A

Features

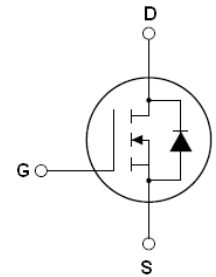
- High Voltage Super Junction MOSFET
- Low On-Resistance and Low Conduction Losses
- Ultra Low Gate Charge
- 100% Avalanche Tested

Application

- Power Factor Correction (PFC)
- Switched Mode Power Supplies(SMPS)
- Uninterruptible Power Supply (UPS)



TO-252 (DPAK)



Schematic Diagram



Description

The GSMN80R1K2K utilizes super junction technology to achieve low on-resistance and low gate charge. The device is ideal for AC-DC switch mode power supplies, AC/DC power conversion and PFC.

Absolute Max Ratings ($T_C=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage ($V_{GS}=0V$)	V_{DS}	800	V
Gate-Source Voltage ($V_{DS}=0V$)	V_{GS}	± 30	V
Continuous Drain Current at $T_C=25^\circ\text{C}$	$I_{D(DC)}$	5	A
Continuous Drain Current at $T_C=100^\circ\text{C}$	$I_{D(DC)}$	3	A
Pulsed Drain Current <small>(Note 1)</small>	$I_{DM(pluse)}$	15	A
Maximum Power Dissipation ($T_C=25^\circ\text{C}$)	P_D	81	W
<small>Derate above 25°C</small>		0.65	W/ $^\circ\text{C}$
Single Pulse Avalanche Energy <small>(Note 2)</small>	E_{AS}	75	mJ
Avalanche Current <small>(Note 1)</small>	I_{AR}	2.5	A
Repetitive Avalanche Energy, t_{AR} Limited by T_{jmax} <small>(Note 1)</small>	E_{AR}	0.4	mJ
Drain Source Voltage Slope, $V_{DS} \leq 480V$,	dv/dt	50	V/ns
Reverse Diode dv/dt , $V_{DS} \leq 480V, I_{SD} < I_D$	dv/dt	5	V/ns
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55-+150	$^\circ\text{C}$

* limited by maximum junction temperature

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case (Maximum)	R_{thJC}	1.54	$^{\circ}C/W$
Thermal Resistance, Junction-to-Ambient (Maximum)	R_{thJA}	62	$^{\circ}C/W$

Electrical Characteristics ($T_A=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
On/off states						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	800			V
Zero Gate Voltage Drain Current($T_C=25^{\circ}C$)	I_{DSS}	$V_{DS}=800V, V_{GS}=0V$			1	μA
Zero Gate Voltage Drain Current($T_C=125^{\circ}C$)	I_{DSS}	$V_{DS}=800V, V_{GS}=0V$			100	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 30V, V_{DS}=0V$			± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5	3	3.5	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=2.5A$		1000	1200	m Ω
Dynamic Characteristics						
Forward Transconductance	g_{FS}	$V_{DS} = 20V, I_D = 2.5A$		5.5		S
Input Capacitance	C_{iss}	$V_{DS}=50V, V_{GS}=0V,$ $F=1.0MHz$		680		pF
Output Capacitance	C_{oss}			55		pF
Reverse Transfer Capacitance	C_{rss}			3.5		pF
Total Gate Charge	Q_g	$V_{DS}=480V, I_D=5A,$ $V_{GS}=10V$		14.5	22	nC
Gate-Source Charge	Q_{gs}			2.8		nC
Gate-Drain Charge	Q_{gd}			5.5		nC
Intrinsic gate resistance	R_G	$f = 1 MHz$ open drain		2		Ω
Switching times						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=480V, I_D=2.5A,$ $R_G=15\Omega, V_{GS}=10V$		7		nS
Turn-on Rise Time	t_r			5		nS
Turn-Off Delay Time	$t_{d(off)}$			70	85	nS
Turn-Off Fall Time	t_f			9	15	nS
Source- Drain Diode Characteristics						
Source-drain current(Body Diode)	I_{SD}	$T_C=25^{\circ}C$			5	A
Pulsed Source-drain current(Body Diode)	I_{SDM}				15	A
Forward On Voltage	V_{SD}	$T_j=25^{\circ}C, I_{SD}=5A, V_{GS}=0V$		0.85	1.2	V
Reverse Recovery Time	t_{rr}	$T_j=25^{\circ}C, I_F=5A, di/dt=100A/\mu s$		240		nS
Reverse Recovery Charge	Q_{rr}			2.2		μC
Peak Reverse Recovery Current	I_{rrm}			16		A

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature

2. $T_j=25^{\circ}C, V_{DD}=50V, V_G=10V, R_G=25\Omega$

Typical Electrical and Thermal Characteristic Curves

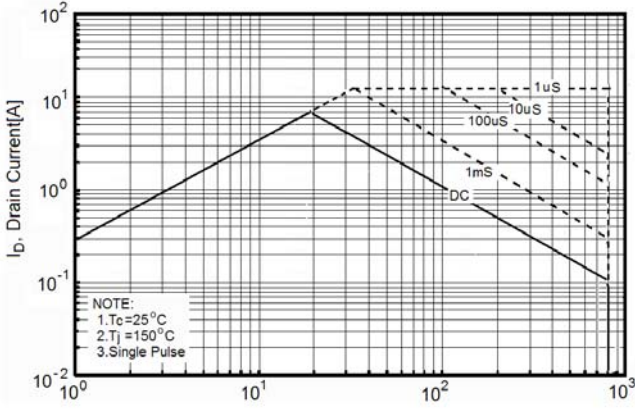


Figure1. Safe Operating Area

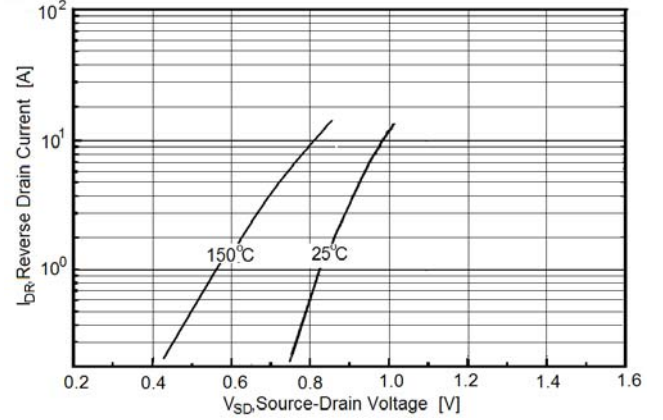


Figure2. Source-Drain Diode Forward Voltage

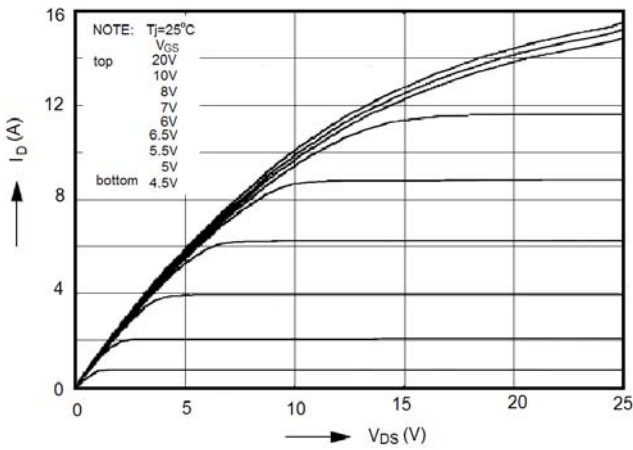


Figure3. Output characteristics

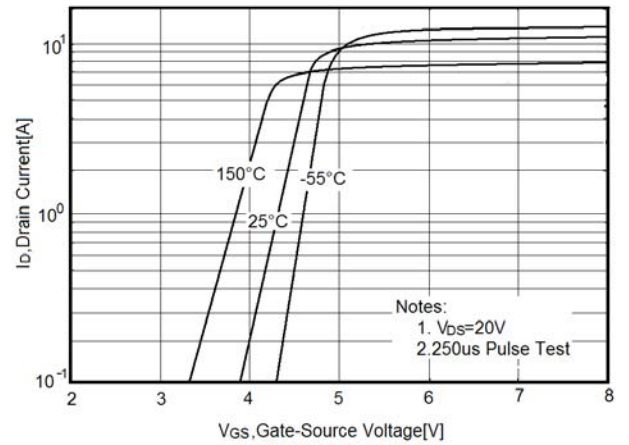


Figure4. Transfer characteristics

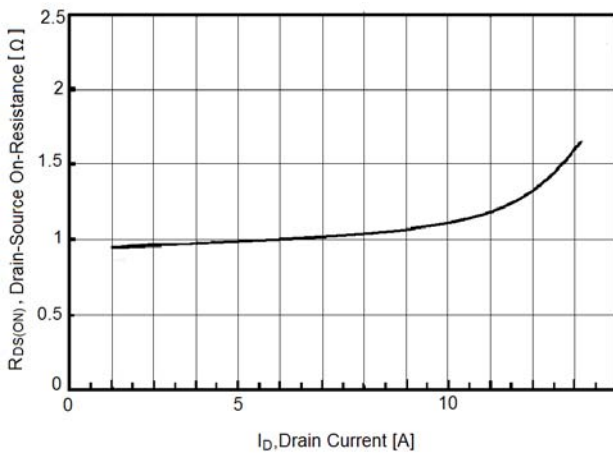


Figure5. Static drain-source on resistance

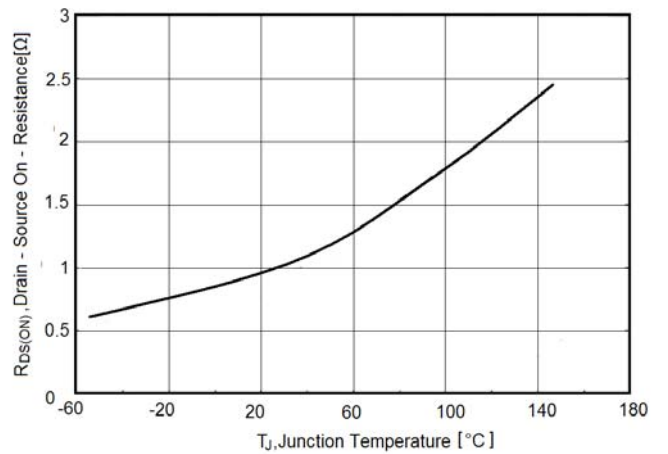


Figure 6. $R_{DS(ON)}$ vs Junction Temperature

Typical Electrical and Thermal Characteristic Curves

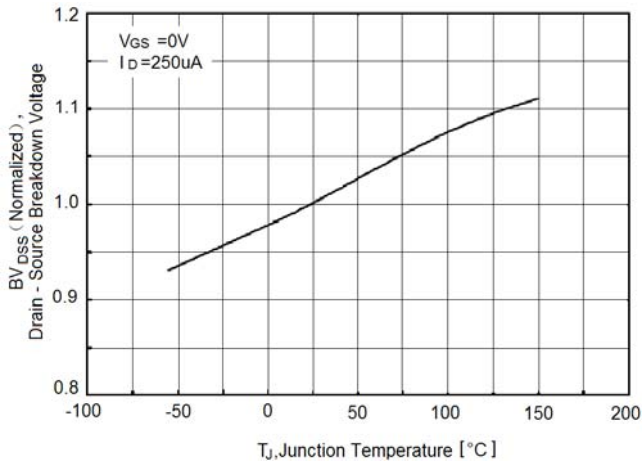


Figure7. BV_{DSS} vs Junction Temperature

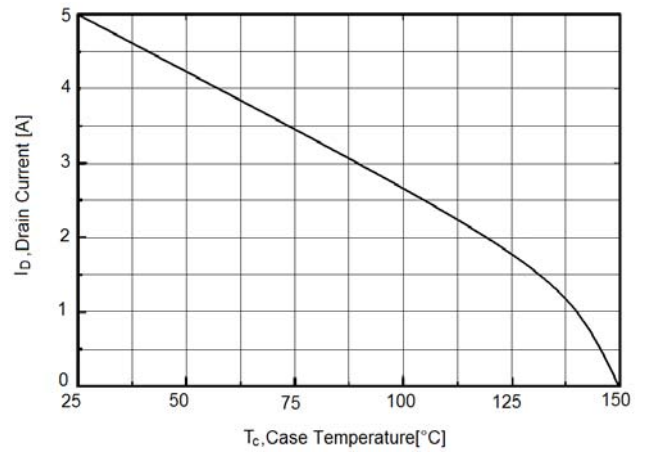


Figure8. Maximum I_D vs Junction Temperature

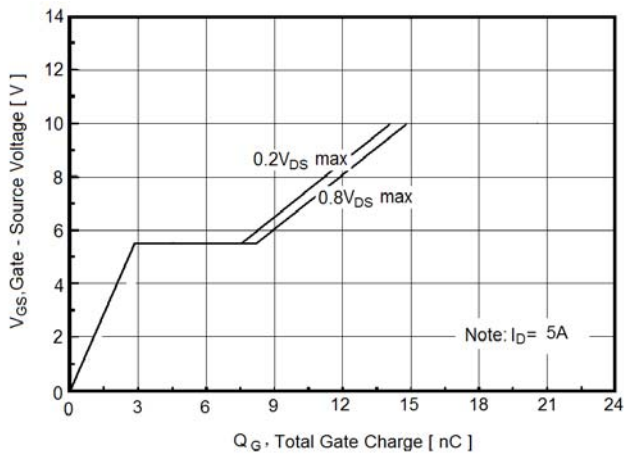


Figure9. Gate charge waveforms

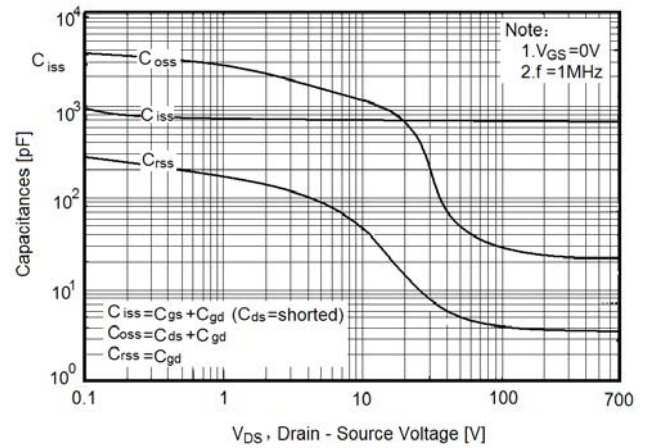


Figure10. Capacitance

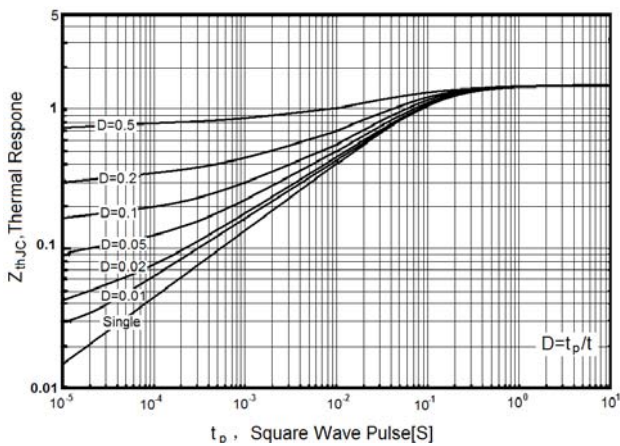
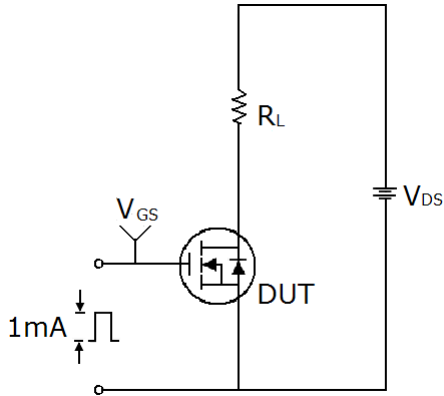


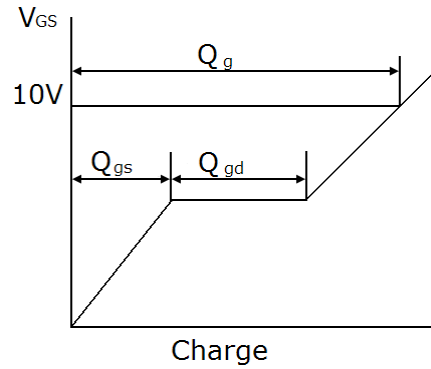
Figure11. Transient Thermal Impedance

Test Circuits and Waveforms

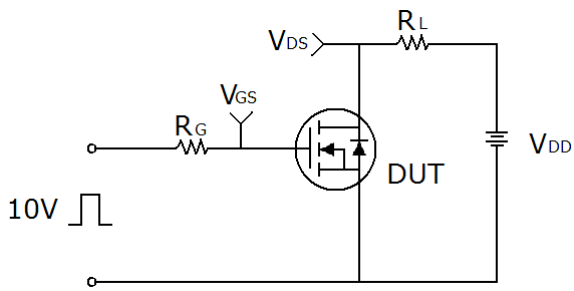
Gate charge test circuit



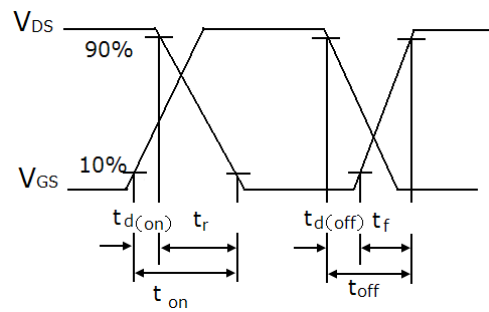
Gate charge waveforms



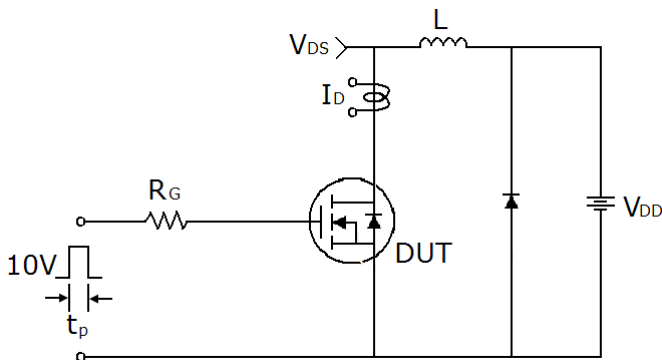
Switch Time Test Circuit



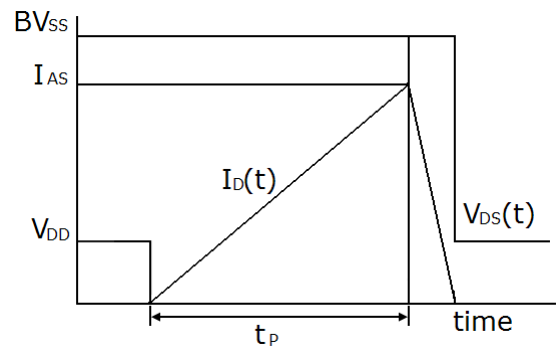
Switch Time Waveforms



.Unclamped Inductive Switching Test Circuit

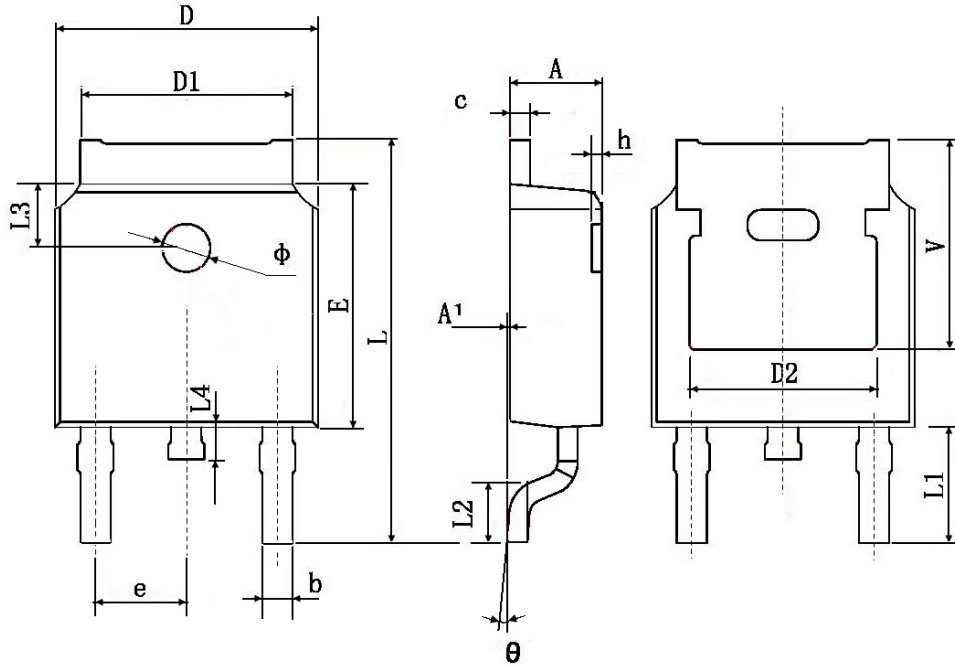


.Unclamped Inductive Switching Waveforms



Package Outline Dimensions

TO-252 (DPAK)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	0.483 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	