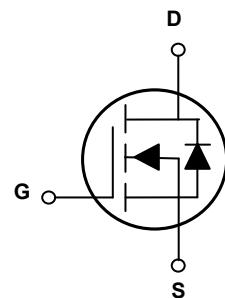
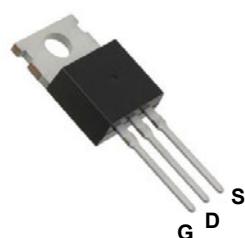


## Main Product Characteristics

$V_{(BR)DSS}$	800V
$R_{DS(ON)}$	1.3Ω (Max.)
$I_D$	4A



TO-220

Schematic Diagram

## Features and Benefits

- Optimized the cell structure.
- Low on-resistance and low gate charge.
- Featuring low switching and drive losses.
- Fast switching and reverse body recovery.
- High ruggedness and robustness.



## Description

The GSFH80R1K3 utilizes the latest techniques to achieve high cell density and low on-resistance. These features make this device extremely efficient and reliable for use in high efficiency switch mode power supplies and a wide variety of other applications.

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

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	$V_{DS}$	800	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Drain Current-Continuous, at Steady-State, ( $T_C=25^\circ\text{C}$ )	$I_D$	4	A
Drain Current-Continuous, at Steady-State, ( $T_C=100^\circ\text{C}$ )		2.5	
Drain Current-Pulsed	$I_{DM}$	16	A
Single Pulse Avalanche Energy <sup>1</sup>	$E_{AS}$	210	mJ
Power Dissipation ( $T_c=25^\circ\text{C}$ )	$P_D$	80	W
		0.64	W/ $^\circ\text{C}$
Body Diode Reverse Voltage Slope <sup>2</sup>	$dv/dt$	48	V/ns
MOS $dv/dt$ Ruggedness <sup>3</sup>	$dv/dt$	100	V/ns
Junction-to-Ambient (PCB Mounted, Steady-State)	$R_{\theta JA}$	62	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.56	$^\circ\text{C}/\text{W}$
Operating Junction Temperature Range	$T_J$	-55 To +150	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-55 To +150	$^\circ\text{C}$

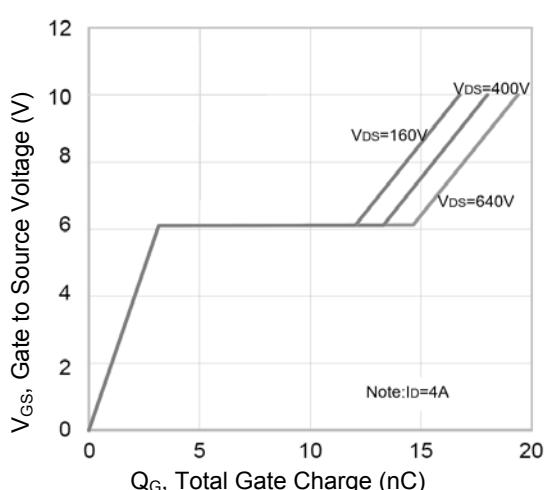
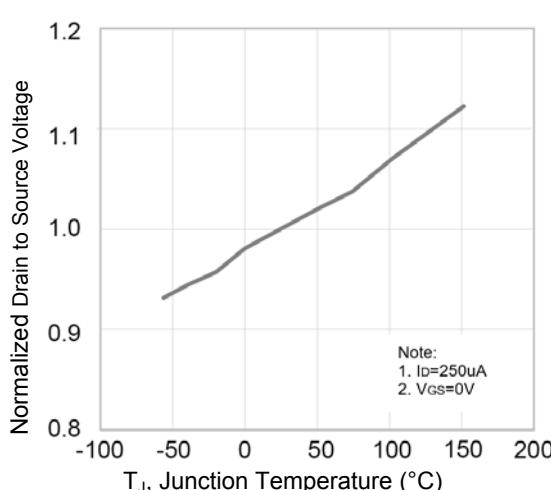
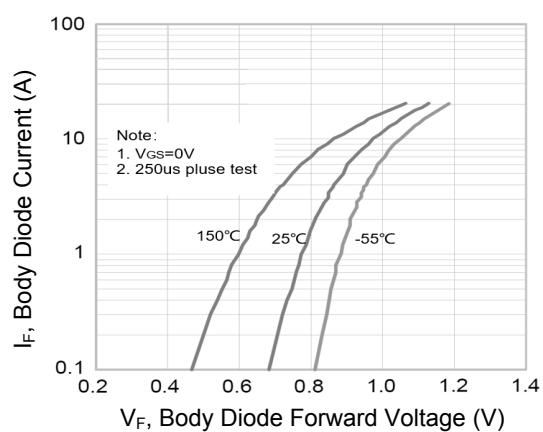
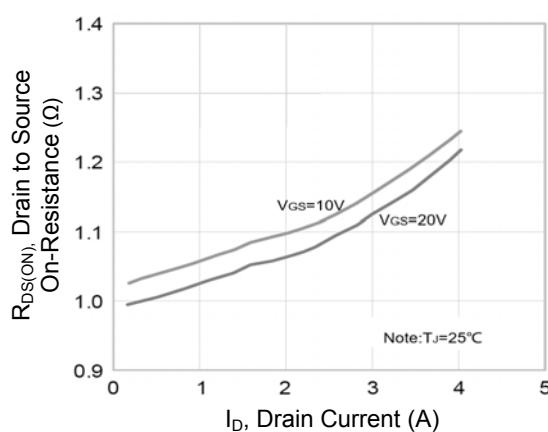
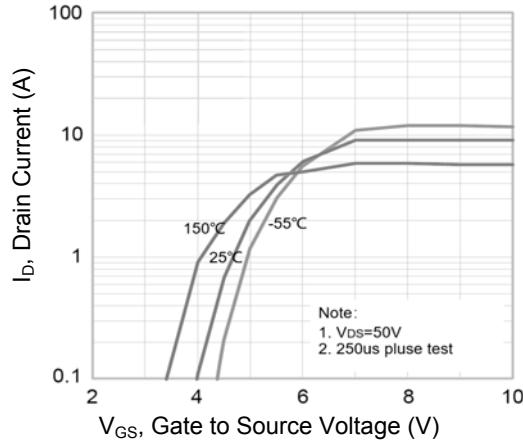
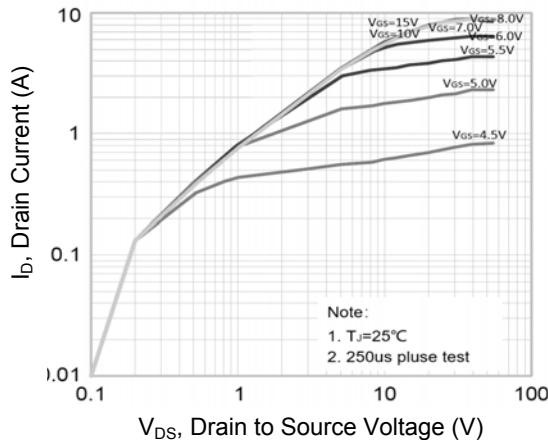
**Electrical Characteristics** ( $T_C=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>On / Off Characteristics</b>						
Drain-Source Breakdown Voltage	$\text{BV}_{\text{DSS}}$	$V_{\text{GS}}=0\text{V}, I_{\text{D}}=250\mu\text{A}$	800	-	-	V
Drain-Source Leakage Current	$I_{\text{DSS}}$	$V_{\text{DS}}=800\text{V}, V_{\text{GS}}=0\text{V}$	-	-	1	$\mu\text{A}$
Gate-Source Forward Current	$I_{\text{GSS}}$	$V_{\text{GS}}=\pm 30\text{V}, V_{\text{DS}}=0\text{V}$	-	-	$\pm 100$	nA
Static Drain-Source On-Resistance	$R_{\text{DS}(\text{ON})}$	$V_{\text{GS}}=10\text{V}, I_{\text{D}}=2\text{A}$	-	1.1	1.3	$\Omega$
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{GS}}=V_{\text{DS}}, I_{\text{D}}=250\mu\text{A}$	2.0	-	4.0	V
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>4,5</sup>	$Q_g$	$V_{\text{DD}}=640\text{V}, I_{\text{D}}=4\text{A}, V_{\text{GS}}=10\text{V}$	-	19.2	-	nC
Gate-Source Charge <sup>4,5</sup>	$Q_{\text{gs}}$		-	3.18	-	
Gate-Drain ("Miller") Charge <sup>4,5</sup>	$Q_{\text{gd}}$		-	11.5	-	
Turn-On Delay Time <sup>4,5</sup>	$t_{\text{d}(\text{on})}$	$V_{\text{DD}}=400\text{V}, R_{\text{G}}=24\Omega, V_{\text{GS}}=10\text{V}, I_{\text{D}}=4\text{A}$	-	9.68	-	nS
Rise Time <sup>4,5</sup>	$t_r$		-	26.6	-	
Turn-Off Delay Time <sup>4,5</sup>	$t_{\text{d}(\text{off})}$		-	58.82	-	
Fall Time <sup>4,5</sup>	$t_f$		-	25.5	-	
Input Capacitance	$C_{\text{iss}}$	$V_{\text{DS}}=100\text{V}, V_{\text{GS}}=0\text{V}, F=1\text{MHz}$	-	352	-	pF
Output Capacitance	$C_{\text{oss}}$		-	19	-	
Reverse Transfer Capacitance	$C_{\text{rss}}$		-	1.9	-	
Gate Resistance	$R_g$	$F=1\text{MHz}$	-	6.8	-	$\Omega$
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current (Body Diode)	$I_s$	$T_C=25^\circ\text{C}$ , MOSFET symbol showing the integral reverse p-n junction diod	-	-	4	A
Pulsed Source Current	$I_{\text{SM}}$		-	-	16	A
Diode Forward Voltage	$V_{\text{SD}}$	$V_{\text{GS}}=0\text{V}, I_s=4\text{A}$	-	1.1	1.4	V
Reverse Recovery Time <sup>2</sup>	$t_{\text{rr}}$	$V_{\text{DD}}=50\text{V}, I_F=4\text{A}, dI/F/dt=100\text{A}/\mu\text{s}$	-	370	-	nS
Reverse Recovery Charge <sup>2</sup>	$Q_{\text{rr}}$		-	2.6	-	$\mu\text{C}$

Note:

1.  $L=79\text{mH}, I_{AS}=2.2\text{A}, V_{DD}=100\text{V}, R_g=25\Omega$ , starting temperature  $T_J=25^\circ\text{C}$ .
2.  $V_{DS}=0-400\text{V}, I_{SD} \leq I_s, T_J=25^\circ\text{C}$ .
3.  $V_{DS}=0-480\text{V}$ .
4. Pulse test : pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .
5. Essentially independent of operating temperature.

## Typical Electrical and Thermal Characteristic Curves



### Typical Electrical and Thermal Characteristic Curves

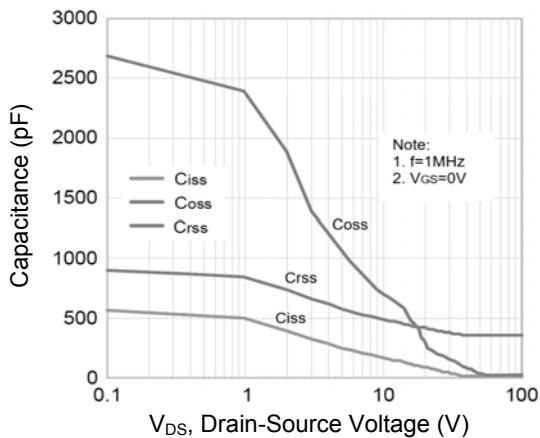


Figure 7. Capacitance Characteristics

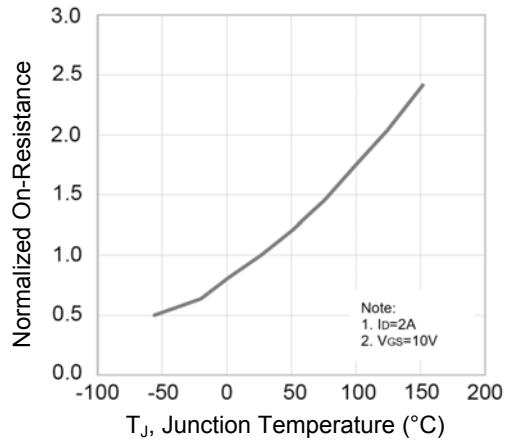


Figure 8. Normalized R<sub>DS(ON)</sub> vs. T<sub>J</sub>

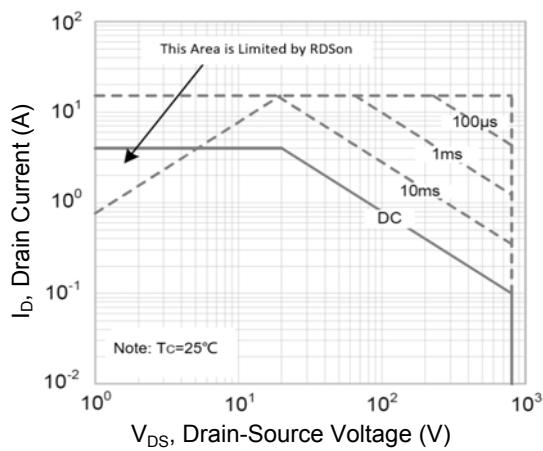
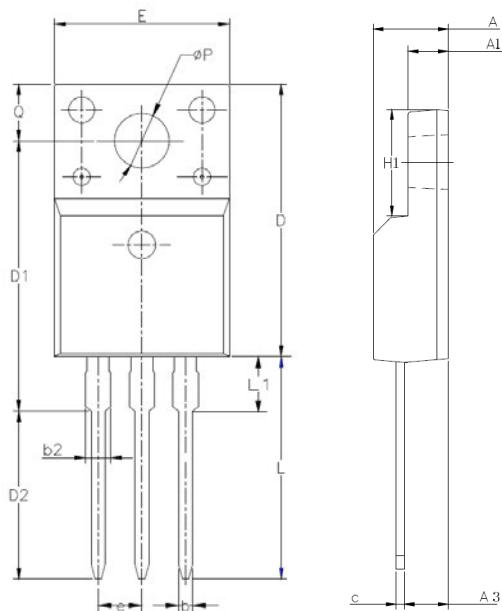


Figure 9. Safe Operation Area

### Package Outline Dimensions (TO-220)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.420	5.020	0.174	0.198
A1	2.300	2.800	0.091	0.110
A3	2.500	3.100	0.098	0.122
b	0.700	0.900	0.028	0.035
b2	-	1.470	-	0.058
c	0.350	0.650	0.014	0.026
D	15.250	16.250	0.600	0.640
D1	15.300	16.300	0.602	0.642
D2	9.300	10.300	0.366	0.406
E	9.730	10.360	0.383	0.408
e	2.540 BCS		0.100 BCS	
H1	6.400	7.000	0.252	0.276
L	12.480	13.480	0.491	0.531
L1	-	3.500	-	0.138
ΦP	3.000	3.400	0.118	0.134
Q	3.050	3.550	0.120	0.140