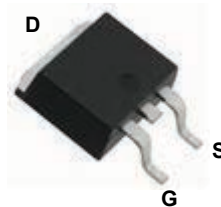
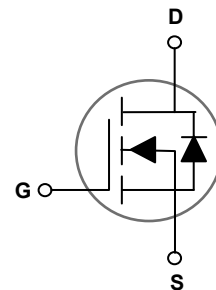


### Main Product Characteristics

$V_{(BR)DSS}$	200V
$R_{DS(ON)}$	0.85Ω
$I_D$	3A



TO-252 (DPAK)



Schematic Diagram

### Features and Benefits

- Advanced MOSFET process technology
- Ideal for high efficiency switched mode power supplies
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery



### Description

The GSFD20N03 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 supply and a wide variety of other applications.

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

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	200	V
Gate-Source Voltage	$V_{GS}$	±30	V
Drain Current – Continuous ( $T_C=25^{\circ}C$ )	$I_D$	3	A
Drain Current – Continuous ( $T_C=100^{\circ}C$ )		1.9	A
Drain Current – Pulsed <sup>1</sup>	$I_{DM}$	12	A
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	4.5	mJ
Single Pulse Avalanche Current <sup>2</sup>	$I_{AS}$	3	A
Power Dissipation ( $T_C=25^{\circ}C$ )	$P_D$	46	W
Power Dissipation – Derate above 25°C		0.37	W/°C
Storage Temperature Range	$T_{STG}$	-55 to +150	°C
Operating Junction Temperature Range	$T_J$	-55 to +150	°C

### Thermal Characteristics

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	---	62	°C/W
Thermal Resistance Junction to Case	$R_{\theta JC}$	---	2.7	°C/W

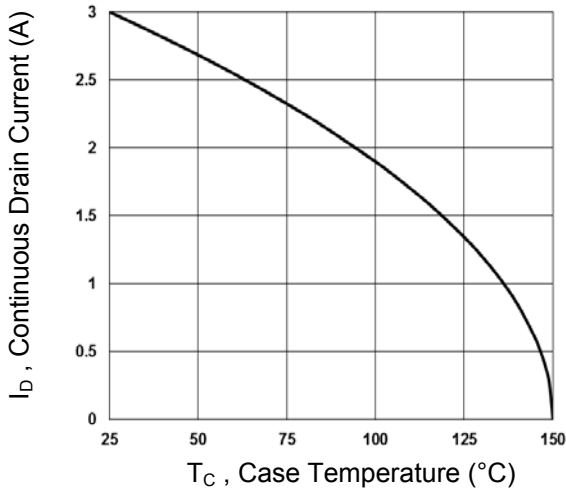
**Electrical Characteristics** ( $T_J=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	200	---	---	V
$BV_{DSS}$ Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to $25^\circ\text{C}$ , $I_D=1\text{mA}$	---	0.5	---	$V/^\circ\text{C}$
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=200V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	$\mu A$
		$V_{DS}=160V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	10	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 30V, V_{DS}=0V$	---	---	$\pm 100$	nA
<b>On Characteristics</b>						
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=2A$	---	0.7	0.85	$\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{DS}, I_D=250\mu A$	3	4	5	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		---	-8	---	$\text{mV}/^\circ\text{C}$
Forward Transconductance	$g_{fs}$	$V_{DS}=10V, I_D=2A$	---	3.6	---	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>3, 4</sup>	$Q_g$	$V_{DS}=160V, V_{GS}=10V, I_D=1A$	---	4.8	9	nC
Gate-Source Charge <sup>3, 4</sup>	$Q_{gs}$		---	2	4	
Gate-Drain Charge <sup>3, 4</sup>	$Q_{gd}$		---	0.8	2	
Turn-On Delay Time <sup>3, 4</sup>	$T_{d(on)}$	$V_{DD}=100V, V_{GS}=10V, R_G=25\Omega, I_D=1A$	---	10	20	nS
Rise Time <sup>3, 4</sup>	$T_r$		---	35	70	
Turn-Off Delay Time <sup>3, 4</sup>	$T_{d(off)}$		---	10	20	
Fall Time <sup>3, 4</sup>	$T_f$		---	28	56	
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V, F=1\text{MHz}$	---	266	500	pF
Output Capacitance	$C_{oss}$		---	160	300	
Reverse Transfer Capacitance	$C_{rss}$		---	55	110	
Gate Resistance	$R_g$	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	---	1.5	3	$\Omega$
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	$I_S$	$V_G=V_D=0V$ , Force Current	---	---	3	A
Pulsed Source Current	$I_{SM}$		---	---	6	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1	V

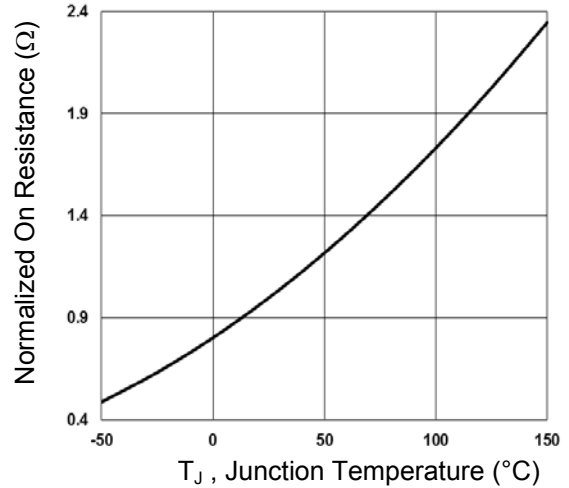
Note:

1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=50V, V_{GS}=10V, L=1\text{mH}, I_{AS}=3A, R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$ .
3. The data tested by pulsed, pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.

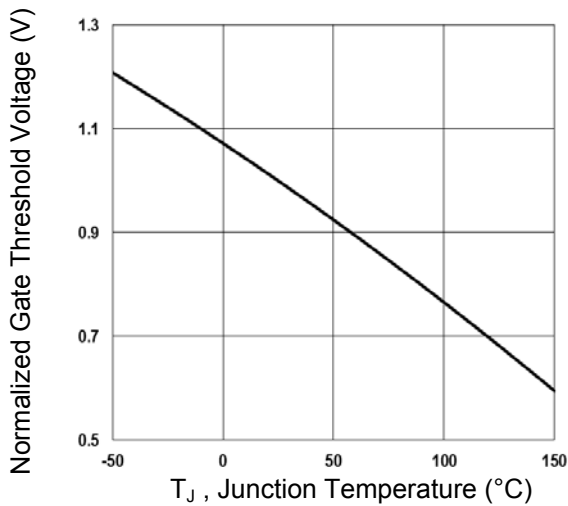
**Typical Electrical and Thermal Characteristic Curves**



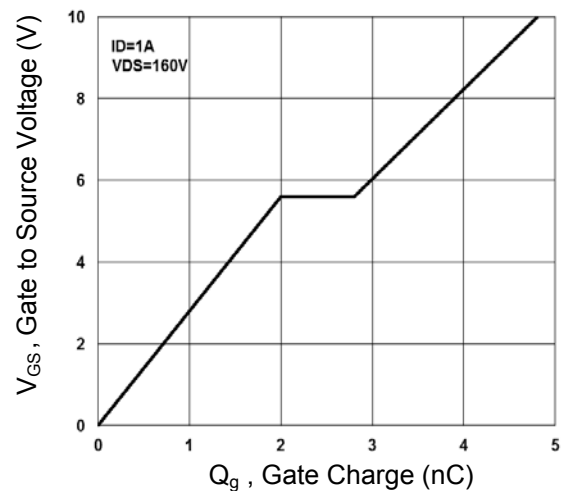
**Fig.1 Continuous Drain Current vs.  $T_c$**



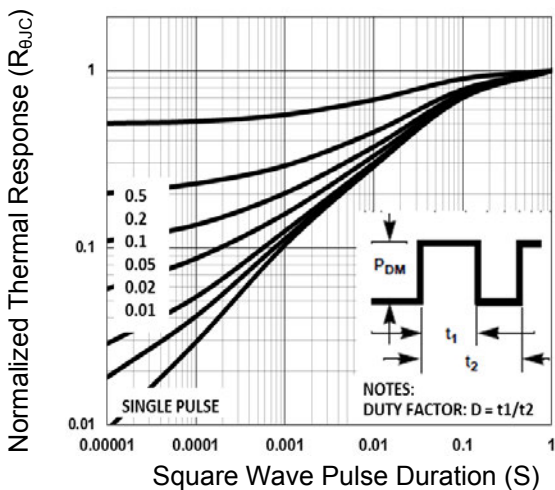
**Fig.2 Normalized  $R_{DS(ON)}$  vs.  $T_j$**



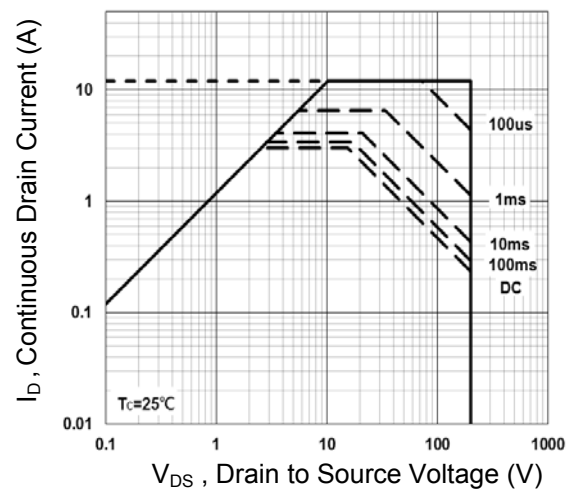
**Fig.3 Normalized  $V_{th}$  vs.  $T_j$**



**Fig.4 Gate Charge Waveform**

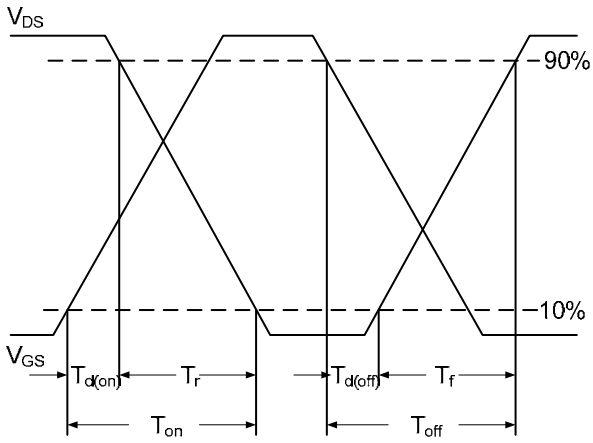


**Fig.5 Normalized Transient Impedance**

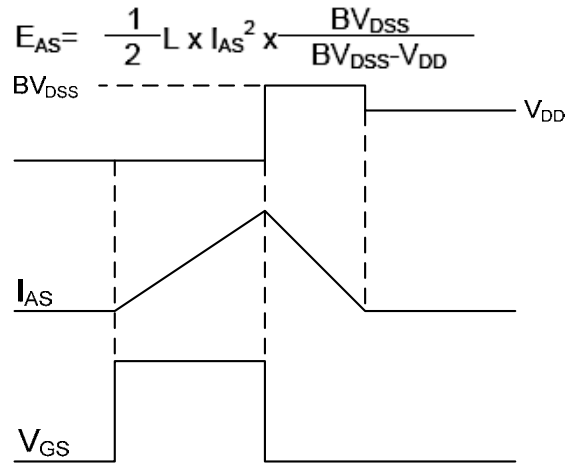


**Fig.6 Maximum Safe Operation Area**

**Typical Electrical and Thermal Characteristic Curves**



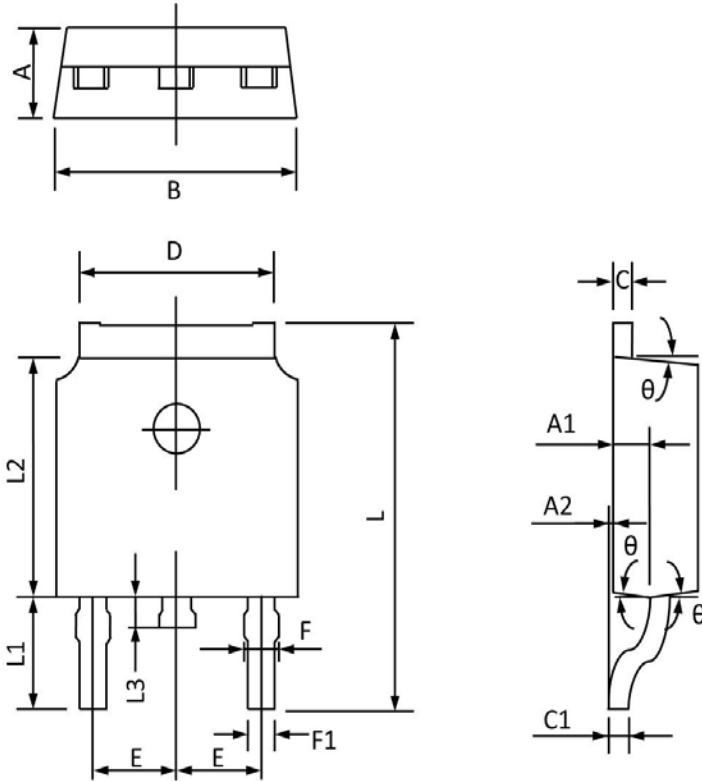
**Fig.7 Switching Time Waveform**



**Fig.8  $E_{AS}$  Waveform**

**Package Outline Dimensions**

**TO-252 (DPAK)**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	2.400	2.200	0.094	0.087
A1	1.110	0.910	0.044	0.036
A2	0.150	0.000	0.006	0.000
B	6.800	6.400	0.268	0.252
C	0.580	0.450	0.023	0.018
C1	0.580	0.460	0.023	0.018
D	5.500	5.100	0.217	0.201
E	2.386	2.186	0.094	0.086
F	0.940	0.600	0.037	0.024
F1	0.860	0.500	0.034	0.020
L	10.400	9.400	0.409	0.370
L1	3.000	2.400	0.118	0.094
L2	6.200	5.400	0.244	0.213
L3	1.200	0.600	0.047	0.024
$\theta$	9°	3°	9°	3°