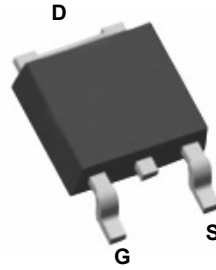
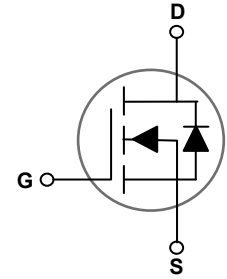


## Main Product Characteristics

$BV_{DSS}$	30V
$R_{DS(ON)}$	9m $\Omega$
$I_D$	55A



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

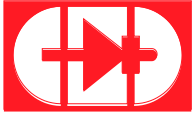


## Description

The GSFD0356 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 ( $T_C=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous ( $T_C=25^\circ\text{C}$ )	$I_D$	55	A
Drain Current-Continuous ( $T_C=100^\circ\text{C}$ )		35	
Drain Current-Pulsed <sup>1</sup>	$I_{DM}$	220	A
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	45	mJ
Single Pulse Avalanche Current <sup>2</sup>	$I_{AS}$	30	A
Power Dissipation ( $T_C=25^\circ\text{C}$ )	$P_D$	40	W
Power Dissipation-Derate above $25^\circ\text{C}$		0.32	
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.1	$^\circ\text{C}/\text{W}$
Operating Junction Temperature Range	$T_J$	-55 To +150	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-55 To +150	$^\circ\text{C}$

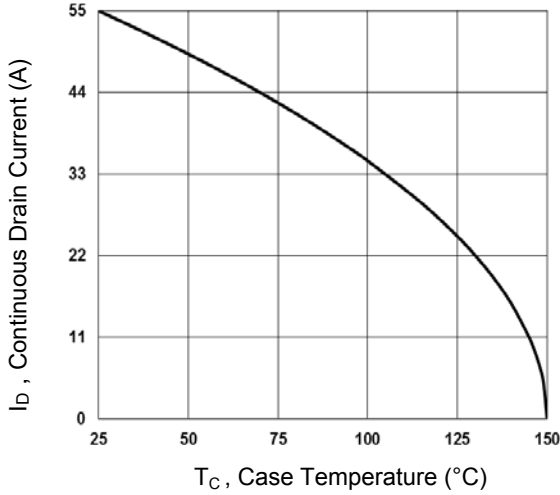

**Electrical Characteristics** ( $T_J=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
$BV_{DSS}$ Temperature Coefficient	$\Delta BV_{DSS} / \Delta T_J$	Reference to $25^\circ\text{C}$ , $I_D=1\text{mA}$	-	0.04	-	$V/^\circ\text{C}$
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=30V, V_{GS}=0V, T_J=25^\circ\text{C}$	-	-	1	$\mu\text{A}$
		$V_{DS}=24V, V_{GS}=0V, T_J=125^\circ\text{C}$	-	-	10	$\mu\text{A}$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
Static Drain-Source On-Resistance <sup>3</sup>	$R_{DS(ON)}$	$V_{GS}=10V, I_D=16A$	-	7.5	9	m $\Omega$
		$V_{GS}=4.5V, I_D=8A$	-	10	13	m $\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.0	1.6	2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		-	-4.0	-	$\text{mV}/^\circ\text{C}$
Forward Transconductance	$g_{fs}$	$V_{DS}=10V, I_D=8A$	-	14	-	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>3,4</sup>	$Q_g$	$V_{DS}=15V, V_{GS}=4.5V, I_D=20A$	-	7.5	-	nC
Gate-Source Charge <sup>3,4</sup>	$Q_{gs}$		-	1.3	-	
Gate-Drain Charge <sup>3,4</sup>	$Q_{gd}$		-	4.5	-	
Turn-On Delay Time <sup>3,4</sup>	$T_{d(on)}$	$V_{DD}=15V, V_{GS}=10V, R_G=3.3\Omega, I_D=15A$	-	4.8	-	nS
Rise Time <sup>3,4</sup>	$T_r$		-	12.5	-	
Turn-Off Delay Time <sup>3,4</sup>	$T_{d(off)}$		-	27.6	-	
Fall Time <sup>3,4</sup>	$T_f$		-	8.2	-	
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V, F=1\text{MHz}$	-	750	-	pF
Output Capacitance	$C_{oss}$		-	150	-	
Reverse Transfer Capacitance	$C_{rss}$		-	110	-	
Gate Resistance	$R_g$	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	-	2.7	-	$\Omega$
<b>Guaranteed Avalanche Energy</b>						
Single Pulse Avalanche Energy	$E_{AS}$	$V_{DD}=25V, L=0.1\text{mH}, I_{AS}=15A$	12	-	-	mJ
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	$I_S$	$V_G=V_D=0V, \text{Force Current}$	-	-	55	A
Pulsed Source Current <sup>3</sup>	$I_{SM}$		-	-	220	A
Diode Forward Voltage <sup>3</sup>	$V_{SD}$	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	-	-	1	V

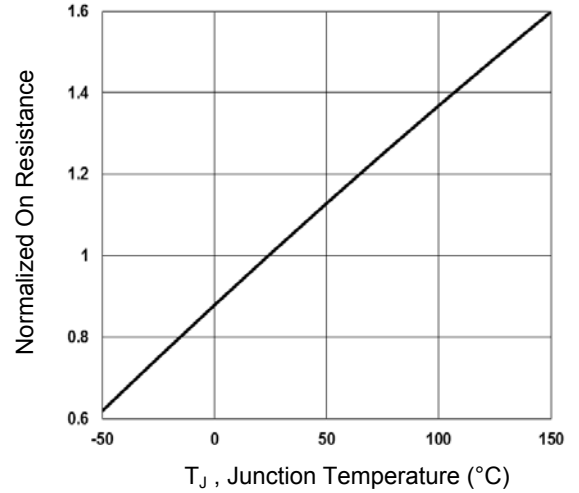
Note:

1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=30A, R_G=25\Omega, \text{Starting } T_J=25^\circ\text{C}$ .
3. Pulse test, pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.

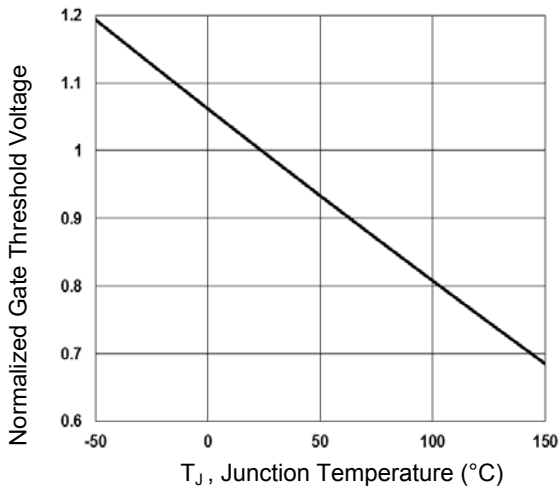
**Typical Electrical and Thermal Characteristic Curves**



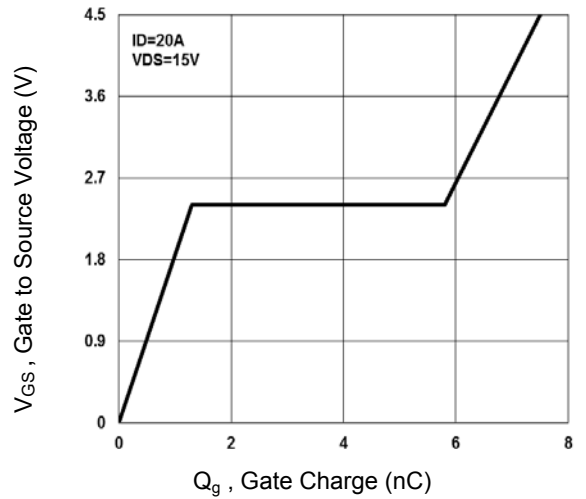
**Figure 1. Continuous Drain Current vs.  $T_C$**



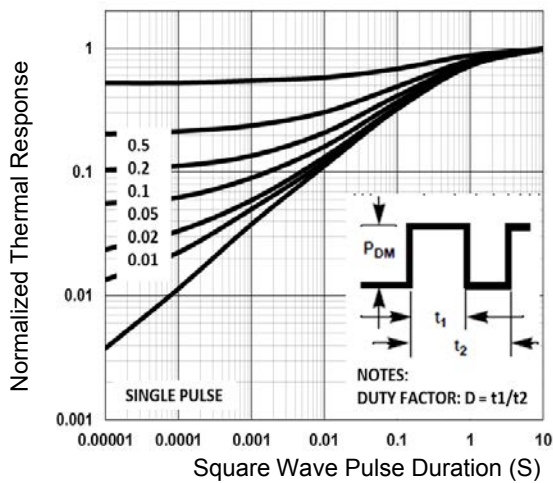
**Figure 2. Normalized  $R_{DS(ON)}$  vs.  $T_J$**



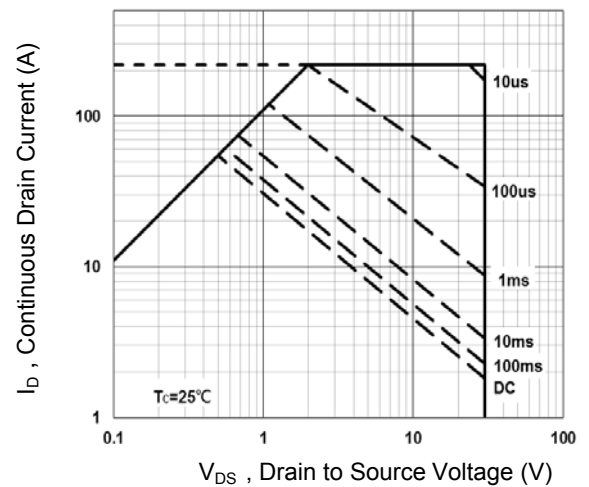
**Figure 3. Normalized  $V_{th}$  vs.  $T_J$**



**Figure 4. Gate Charge Waveform**

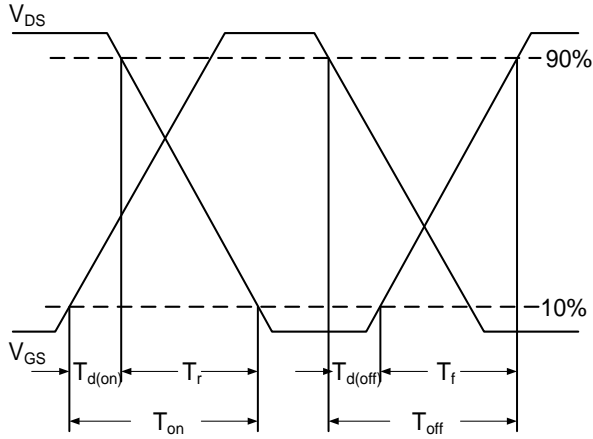


**Figure 5. Normalized Transient Impedance**

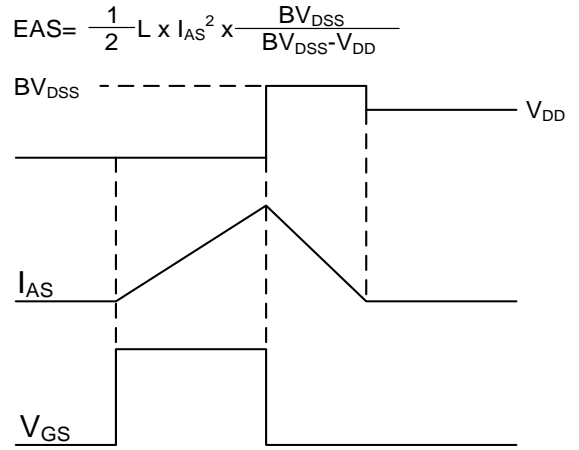


**Figure 6. Maximum Safe Operation Area**

**Typical Electrical and Thermal Characteristic Curves**



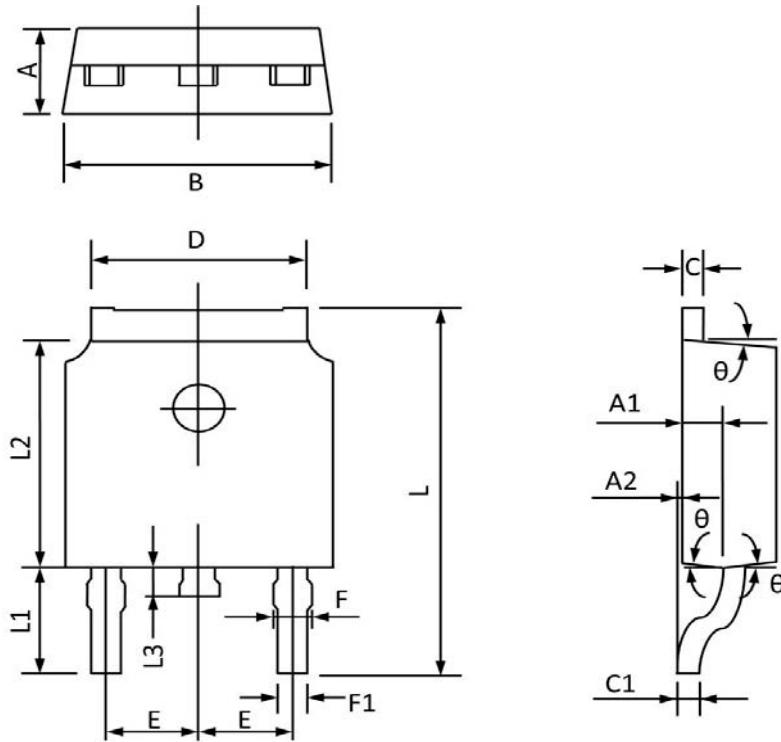
**Figure 7. Switching Time Waveform**



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

**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	0.910	1.110	0.036	0.044
A2	0.000	0.150	0.000	0.006
B	6.500	6.700	0.256	0.264
C	0.460	0.580	0.018	0.023
C1	0.460	0.580	0.018	0.023
D	5.100	5.460	0.201	0.215
E	2.186	2.386	0.086	0.094
F	0.740	0.940	0.029	0.037
F1	0.660	0.860	0.026	0.034
L	9.800	10.400	0.386	0.409
L1	2.9REF		0.114REF	
L2	6.000	6.200	0.236	0.244
L3	0.600	1.000	0.024	0.039
θ	3°	9°	3°	9°