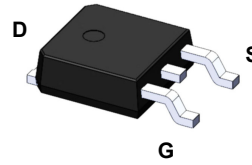
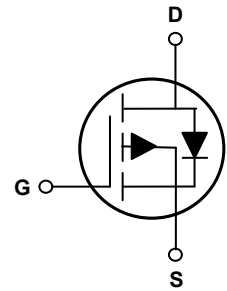


### Main Product Characteristics

$V_{(BR)DSS}$	-40V
$R_{DS(ON)}$	5m $\Omega$ (max.)
$I_D$	-88A



TO-252



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 GSFD4005 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 ( $T_A=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	$V_{DS}$	-40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous ( $T_C=25^\circ\text{C}$ ), $V_{GS}=10\text{V}^1$	$I_D$	-88	A
Drain Current-Continuous ( $T_C=100^\circ\text{C}$ ), $V_{GS}=10\text{V}^1$		-70	A
Drain Current-Pulsed <sup>2</sup>	$I_{DM}$	-352	A
Pulsed Source Current (Body Diode) <sup>2</sup>	$I_{SM}$	-352	A
Maximum Power Dissipation ( $T_C=25^\circ\text{C}$ ) <sup>3</sup>	$P_D$	124	W
Single Pulse Avalanche Energy ( $L=0.3\text{mH}$ )	$E_{AS}$	576	mJ
Single Pulse Avalanche Current ( $L=0.3\text{mH}$ )	$I_{AS}$	48	A
Junction-to-Ambient ( $t \leq 10\text{s}$ ) <sup>4</sup>	$R_{\theta JA}$	62	$^\circ\text{C/W}$
Maximum Junction-to-Case <sup>5</sup>	$R_{\theta JC}$	1.21	$^\circ\text{C/W}$
Operating Junction Temperature Range	$T_J$	-55 To +175	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-55 To +175	$^\circ\text{C}$

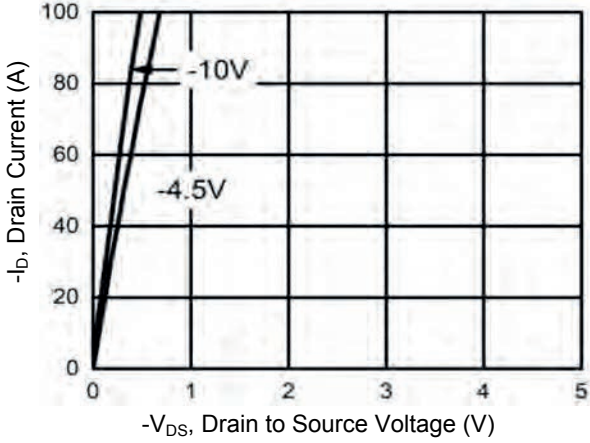
**Electrical Characteristics** ( $T_A=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>On / Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-40	-	-	V
Drain-to-Source Leakage Current	$I_{DSS}$	$V_{DS}=-40V, V_{GS}=0V$	-	-	-1	$\mu A$
Drain-to-Source Leakage Current		$V_{DS}=-40V, V_{GS}=0V, T_J=125^\circ C$	-	-	-50	$\mu A$
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.1	-1.7	-2.8	V
Drain Static-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-20A$	-	3.4	5	m $\Omega$
		$V_{GS}=-4.5V, I_D=-20A$	-	4.5	6	m $\Omega$
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge	$Q_g$	$V_{DD}=-20V, I_D=-20A, V_{GS}=-10V$	-	119	-	nC
Gate-Source Charge	$Q_{gs}$		-	15	-	
Gate-Drain Charge	$Q_{gd}$		-	23	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=-20V, R_G=3\Omega, R_L=1.0\Omega, V_{GS}=-10V, I_D=-20A$	-	17	-	nS
Rise Time	$t_r$		-	18	-	
Turn-Off Delay Time	$t_{d(off)}$		-	69	-	
Fall Time	$t_f$		-	33	-	
Input Capacitance	$C_{iss}$	$V_{DS}=-20V, V_{GS}=0V, F=1MHz$	-	6800	-	pF
Output Capacitance	$C_{oss}$		-	546	-	
Reverse Transfer Capacitance	$C_{rss}$		-	345	-	
Gate Resitance	$R_g$	$F=1MHz$	-	2.1	-	$\Omega$
<b>Source-Drain Ratings and Characteristics</b>						
Maximum Body-Diode Continuous Current	$I_S$	MOSFET symbol showing the integral reverse p-n junction diode.	-	-88	-	A
Maximum Body-Diode Pulse Current	$I_{SM}$		-	-352	-	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=-20A, T_J=25^\circ C$	-	-0.8	-1.2	V
Reverse Recovery Time	$t_{rr}$	$I_F=-20A, di/dt=100A/\mu s, T_J=25^\circ C$	-	27	-	nS
Reverse Recovery Charge	$Q_{rr}$		-	146	-	nC

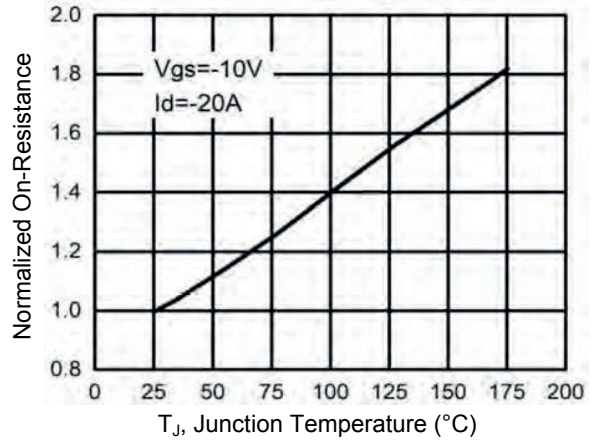
Note:

1. Calculated continuous current based on maximum allowable junction temperature.
2. Repetitive rating; pulse width limited by max. junction temperature.
3. The power dissipation  $P_D$  is based on max. junction temperature, using junction-to-case thermal resistance.
4. The value of  $R_{\theta JA}$  is measured with the device mounted on 1inch<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ C$ .

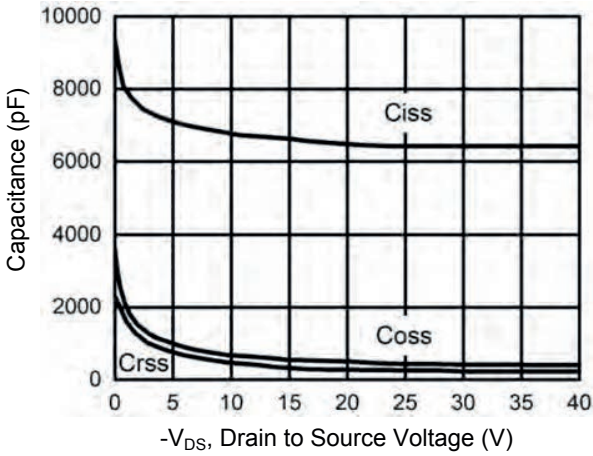
**Typical Electrical and Thermal Characteristic Curves**



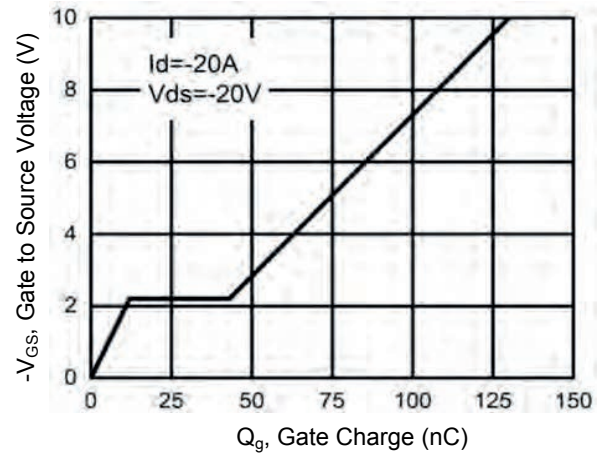
**Figure 1. Output Characteristics**



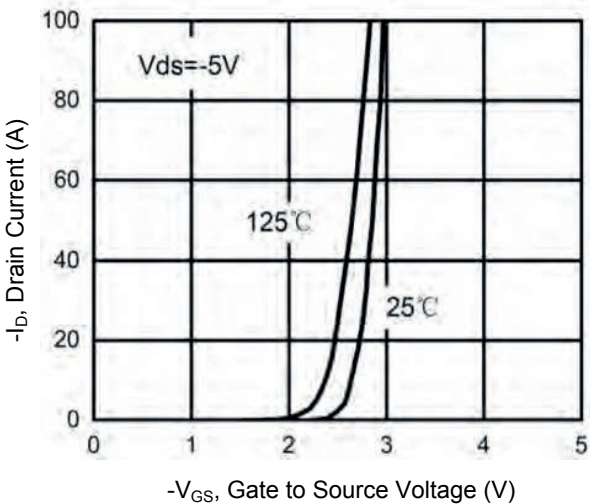
**Figure 2. Normalized R<sub>DS(ON)</sub> Vs. T<sub>J</sub>**



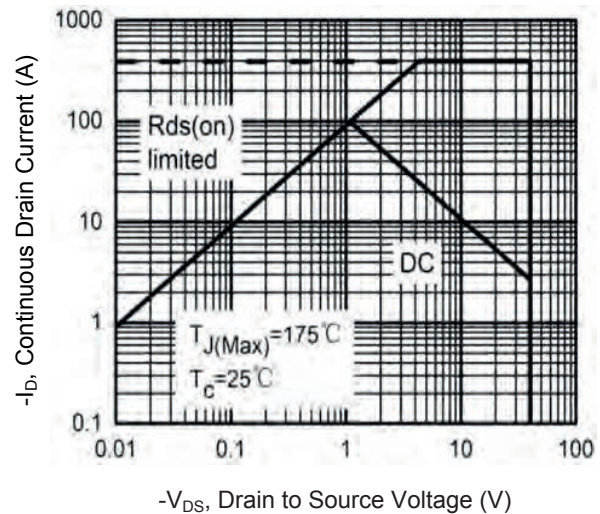
**Figure 3. Capacitance Characteristics**



**Figure 4. Gate Charge Waveform**

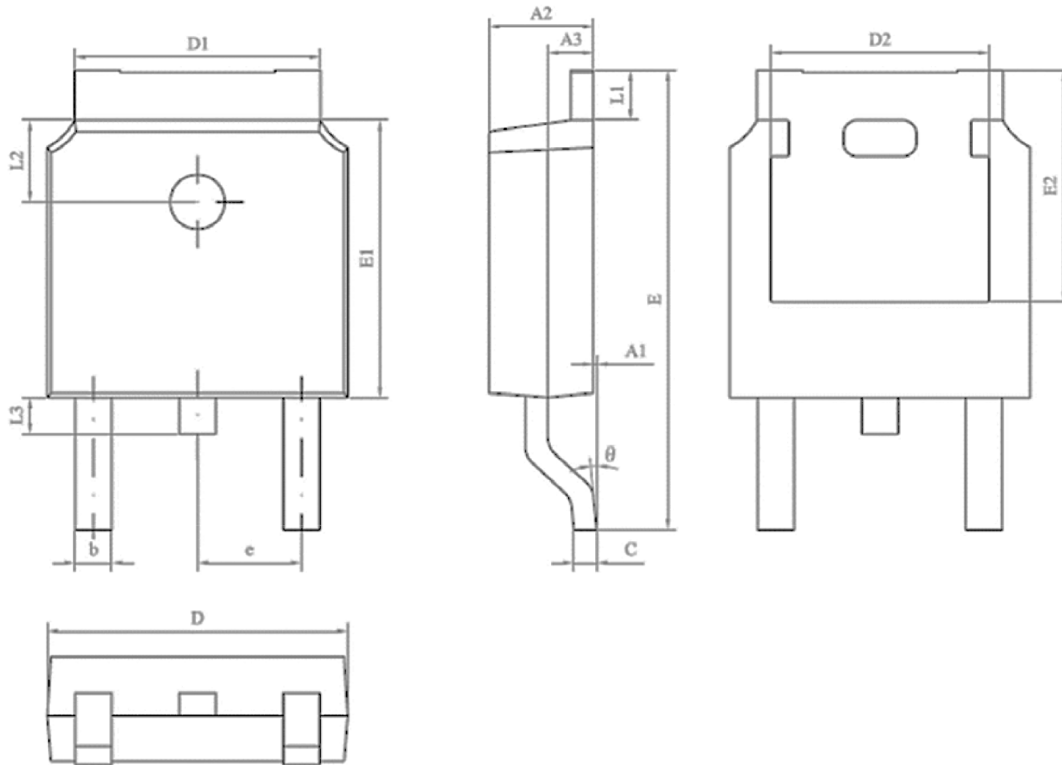


**Figure 5. Transfer Characteristics**



**Figure 6. Maximum Safe Operation Area**

## Package Outline Dimensions (TO-252/DPAK)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A1	0.00	0.10	0.000	0.004
A2	2.20	2.40	0.087	0.094
A3	0.09	1.10	0.004	0.043
b	0.75	0.85	0.030	0.033
C	0.50	0.60	0.020	0.024
D	6.50	6.70	0.256	0.264
D1	5.30	5.50	0.209	0.217
D2	4.70	4.90	0.185	0.193
E	9.90	10.30	0.390	0.406
E1	6.00	6.20	0.236	0.244
E2	5.00	5.20	0.197	0.205
e	2.20	2.40	0.087	0.094
L1	0.90	1.25	0.035	0.049
L2	1.70	1.90	0.067	0.075
L3	0.60	1.00	0.024	0.039
θ	0°	8°	0°	8°