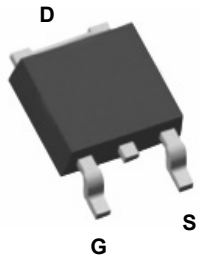
GOOD-ARK SEMICONDUCTOR

GSFD4015

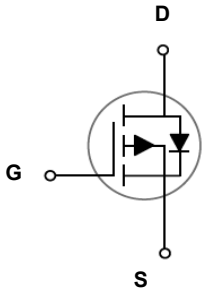
-40V P-Channel MOSFET

Main Product Characteristics

BV_{DSS}	-40V
$R_{DS(ON)}$	15mΩ (max.)
I_D	-40A



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 GSFD4015 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°C unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	$V_{(BR)DSS}$	-40	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous, T_C=25°C, V_{GS}=10V[1]	I_D	-40	A
Drain Current-Continuous, T_C=100°C, V_{GS}=10V[1]		-27	
Drain Current-Pulsed[2]	I_{DM}	-160	A
Pulsed Source Current (Body Diode)[2]	I_{SM}	-160	A
Maximum Power Dissipation (T_C=25°C)[3]	P_D	80	W
Single Pulse Avalanche Energy, (L=0.3mH)	E_{AS}	245	mJ
Single Pulse Avalanche Current, (L=0.3mH)	I_{AS}	40	A
Junction-to-Ambient, (t ≤ 10s)[4]	$R_{\theta JA}$	62	°C/W
Maximum Junction-to-Case[5]	$R_{\theta JC}$	1.56	°C/W
Operating Junction Temperature Range	T_J	-55 To +150	°C
Storage Temperature Range	T_{STG}	-55 To +150	°C

Electrical Characteristics (T_A=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
On / Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=-250uA	-40	-	-	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=-40V, V_{GS}=0V	-	-	-1	μA
		V_{DS}=-40V, V_{GS}=0V T_J=125°C	-	-	-50	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-20A	-	11	15	mΩ
		V_{GS}=-4.5V, I_D=-10A	-	15	20	
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=-250uA	-1	-1.6	-3	V
Dynamic and Switching Characteristics						
Total Gate Charge	Q_g	V_{DD}=-20V, I_D=-20A V_{GS}=-10V	-	67	-	nC
Gate-Source Charge	Q_{gs}		-	11	-	
Gate-to-Drain Charge	Q_{gd}		-	12	-	
Turn-On Delay Time	$t_{d(on)}$	V_{DD}=-30V, R_G=3Ω, R_L=1.5Ω, V_{GS}=-10V, I_D=-20A	-	8	-	nS
Rise Time	t_r		-	26.5	-	
Turn-Off Delay Time	$t_{d(off)}$		-	105.2	-	
Fall Time	t_f		-	142.1	-	
Input Capacitance	C_{iss}	V_{DS}=-20V, V_{GS}=0V, F=1MHz	-	3680	-	pF
Output Capacitance	C_{oss}		-	264	-	
Reverse Transfer Capacitance	C_{rss}		-	294	-	
Gate Resistance	R_G	F=1MHz	-	4.3	-	Ω
Drain-Source Diode Characteristics and Maximum Ratings						
Maximum Body-Diode Continuous Current	I_S	MOSFET symbol showing the integral reverse p-n junction diode.	-	-40	-	A
Maximum Body-Diode Pulse Current	I_{SM}		-	-160	-	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=-20A T_J=25°C	-	-0.8	-1.2	V
Reverse Recovery Time	T_{rr}	T_J=25°C, I_F=-30A, di/dt=100A/μs	-	15.5	-	nS
Reverse Recovery Charge	Q_{rr}		-	10.5	-	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 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C.

Typical Electrical and Thermal Characteristic Curves

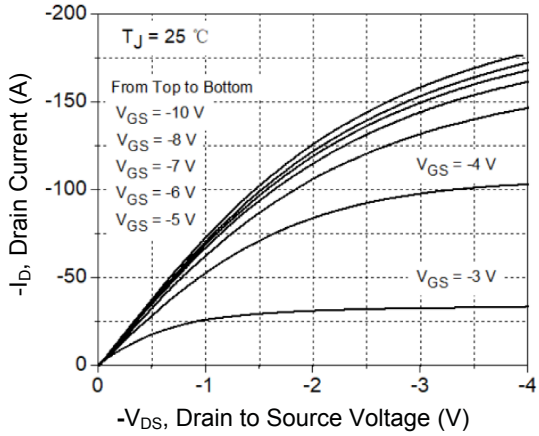


Figure 1. Typical Output Characteristics

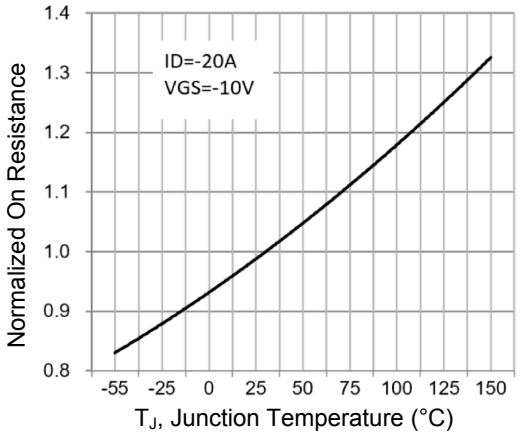


Figure 2. Normalized R_{DSON} vs. T_J

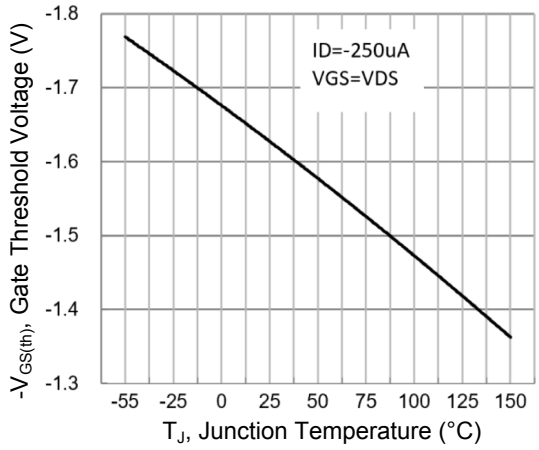


Figure 3. Gate Threshold Voltage vs. T_J

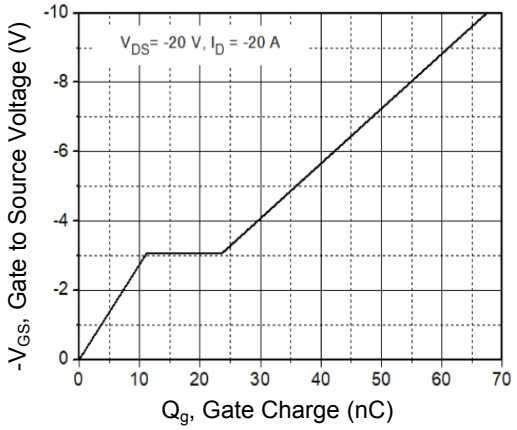


Figure 4. Gate Charge Characteristics

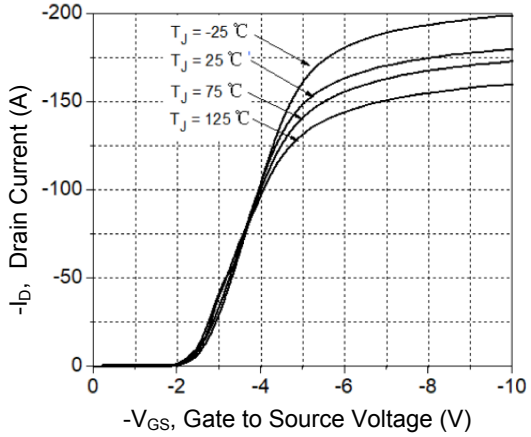


Figure 5. Transfer Characteristics

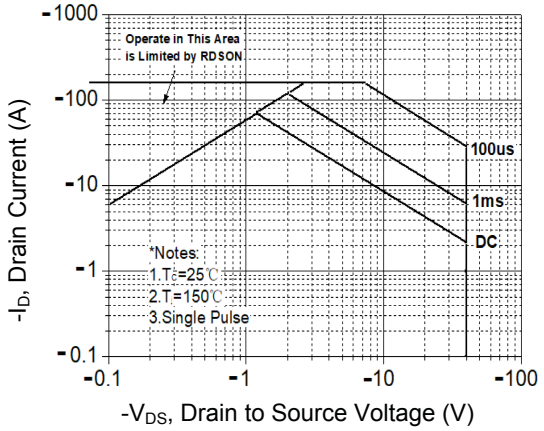
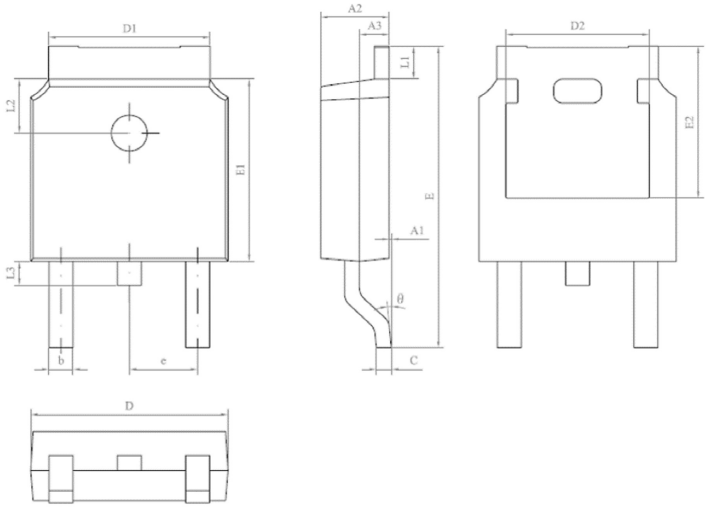


Figure 6. Safe Operation Area

Package Outline Dimensions TO-252 (DPAK)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A1	0.000	0.100	0.000	0.004
A2	2.200	2.400	0.087	0.094
A3	0.090	1.100	0.004	0.043
b	0.750	0.850	0.030	0.033
C	0.500	0.600	0.020	0.024
D	6.500	6.700	0.256	0.264
D1	5.300	5.500	0.209	0.217
D2	4.700	4.900	0.185	0.193
E	9.900	10.300	0.390	0.406
E1	6.000	6.200	0.236	0.244
E2	5.000	5.200	0.197	0.205
e	2.400	2.200	0.094	0.087
L1	0.900	1.250	0.035	0.049
L2	1.700	1.900	0.067	0.075
L3	0.600	1.000	0.024	0.039
θ	0°	8°	0°	8°