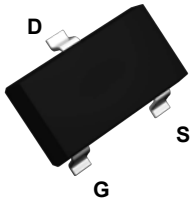
GOOD-ARK SEMICONDUCTOR

GSFC138A

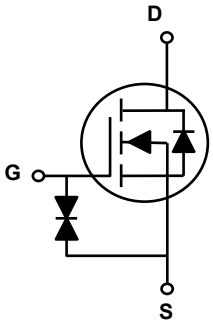
60V N-Channel MOSFET

Main Product Characteristics

BV_{DSS}	60V
$R_{DS(ON)}$	2Ω @10V (Max.)
	3.6Ω @4.5V (Max.)
I_D	0.28A



SOT-23



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 GSFC138A 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_A=25°C unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous (T_A=25°C)	I_D	0.28	A
Drain Current-Continuous (T_A=70°C)		0.23	
Drain Current-Pulsed (T_A=25°C)[1]	I_{DM}	1.12	A
Power Dissipation (T_A=25°C)	P_D	0.44	W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	350	°C/W
Operating Junction Temperature Range	T_J	-50 To +175	°C
Storage Temperature Range	T_{STG}	-50 To +175	°C

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250uA	60	-	-	V
Zero Gate Voltage Drain Current (T_A=25°C)	I_{DSS}	V_{DS}=60V, V_{GS}=0V	-	-	1	uA
Zero Gate Voltage Drain Current (T_A=125°C)		V_{DS}=48V, V_{GS}=0V	-	-	100	uA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	-	-	±10	uA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=250uA	0.6	1.0	1.5	V
Drain-Source On-State Resistance[2]	$R_{DS(ON)}$	V_{GS}=10V, I_D=0.22A	-	-	2.0	Ω
		V_{GS}=4.5V, I_D=0.22A	-	-	3.6	Ω
Dynamic and Switching Characteristics						
Total Gate Charge	Q_g	V_{DS}=10V, V_{GS}=10V, I_D=0.25A	-	1.5	-	nC
Gate-Source Charge	Q_{gs}		-	0.31	-	
Gate-Drain Charge	Q_{gd}		-	0.44	-	
Turn-On Delay Time	$T_{d(on)}$	V_{DD}=30V, V_{GS}=10V R_G=3.3Ω, I_D=0.3A	-	4.0	-	nS
Rise Time	T_r		-	2.7	-	
Turn-Off Delay Time	$T_{d(off)}$		-	9.4	-	
Fall Time	T_f		-	33	-	
Input Capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, F=1MHz	-	30	-	pF
Output Capacitance	C_{oss}		-	6.1	-	
Reverse Transfer Capacitance	C_{rss}		-	3.1	-	
Drain-Source Diode Characteristics and Maximum Ratings						
Source Drain Current (Body Diode)	I_{SD}	T_A=25°C	-	-	0.28	A
Diode Forward Voltage[2]	V_{SD}	V_{GS}=0V, I_{SD}=0.2A, T_J=25°C	-	0.88	1.3	V
Reverse Recovery Time	t_{rr}	I_F=0.5A, V_R=10V d_I/d_t=100A/us,	-	8.2	-	nS
Reverse Recovery Charge	Q_{rr}		-	3.2	-	nC

Notes:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2. Pulse test: pulse width≤300us, duty cycle≤2%.

Typical Electrical and Thermal Characteristic Curves

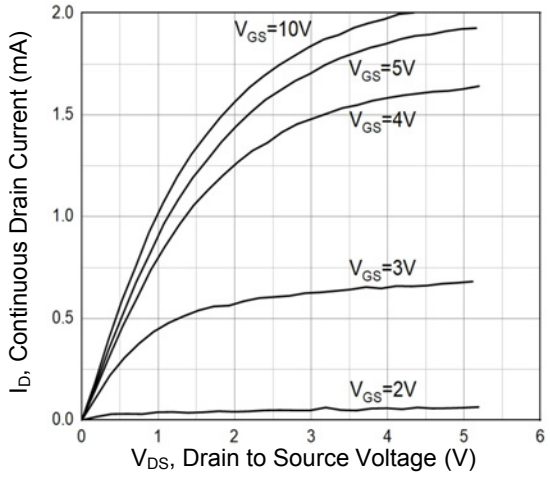


Figure 1. Typical Output Characteristics

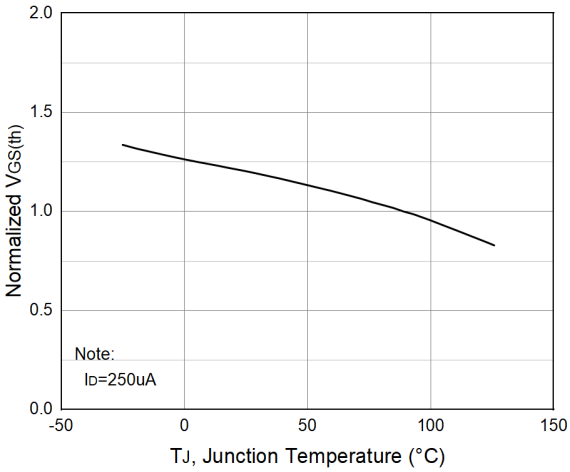


Figure 2. Normalized Threshold Voltage vs. T_J

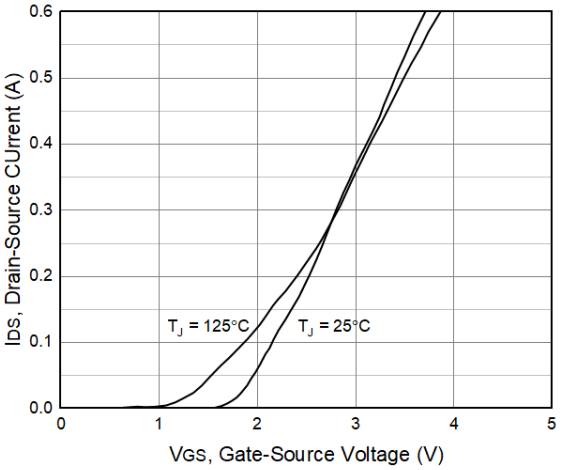


Figure 3. Typical Transfer Characteristics

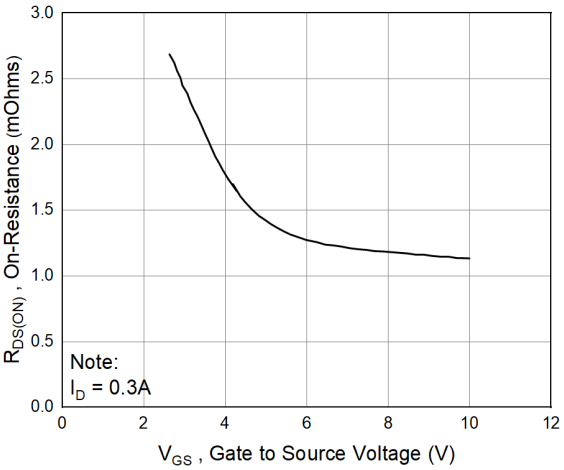


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

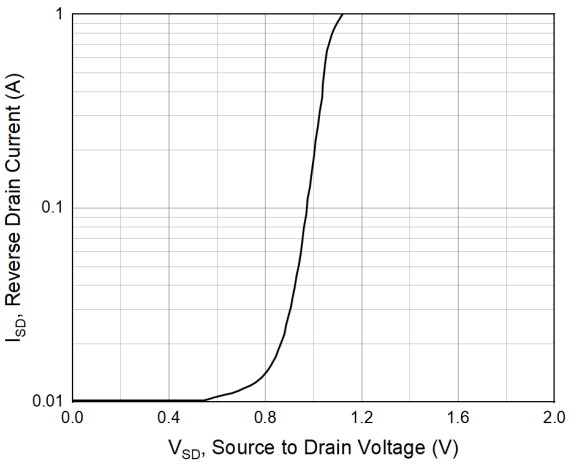


Figure 5. Typical Source - Drain Diode Forward Voltage

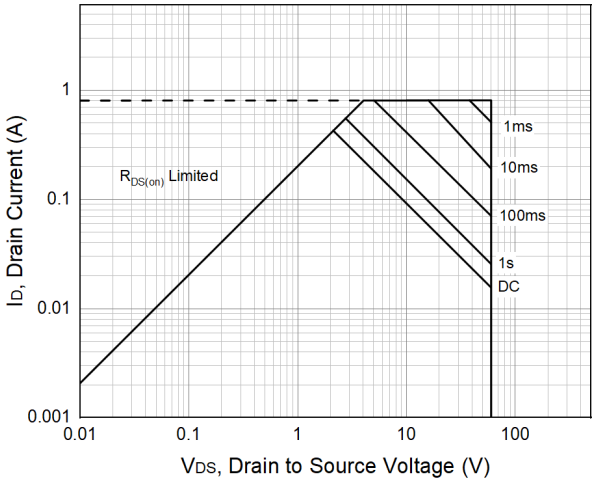


Figure 6. Maximum Safe Operating Area

Typical Electrical and Thermal Characteristic Curves

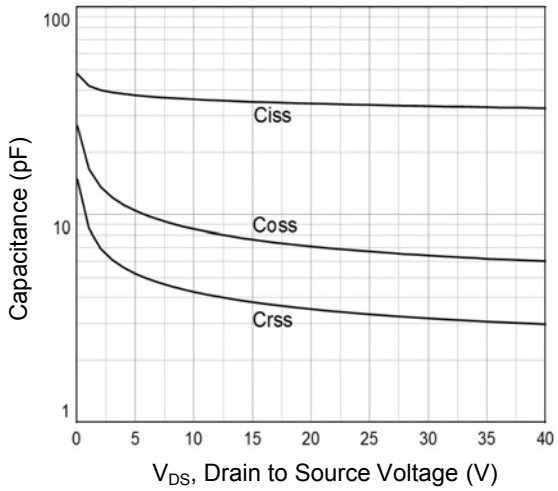


Figure 7. Capacitance Characteristics

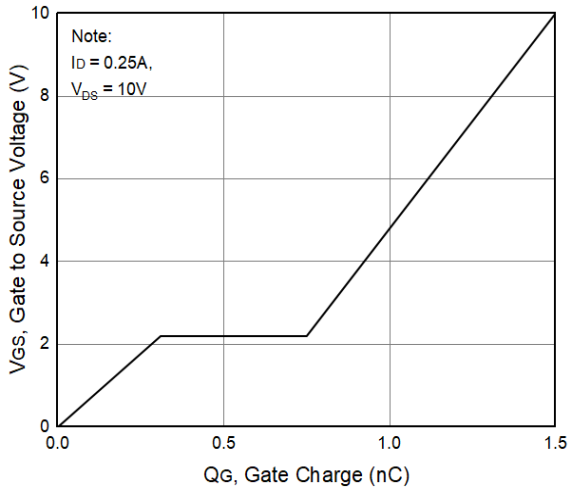


Figure 8. Gate Charge Characteristics

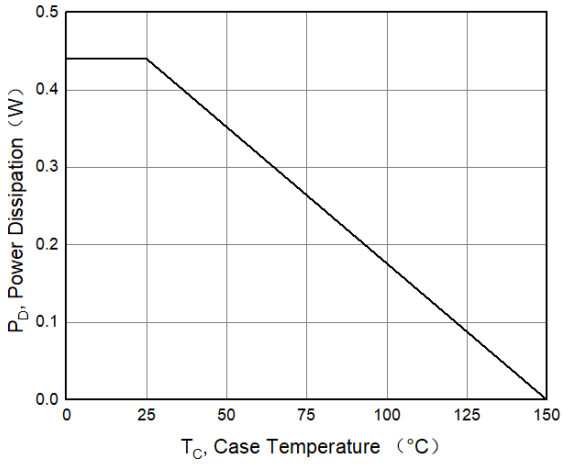


Figure 9. Power Dissipation vs. Case Temperature

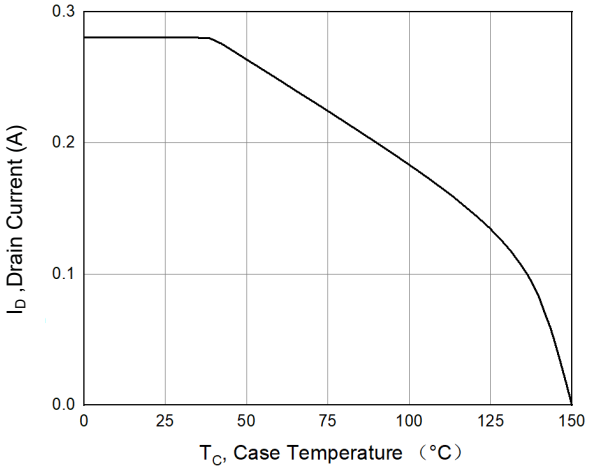
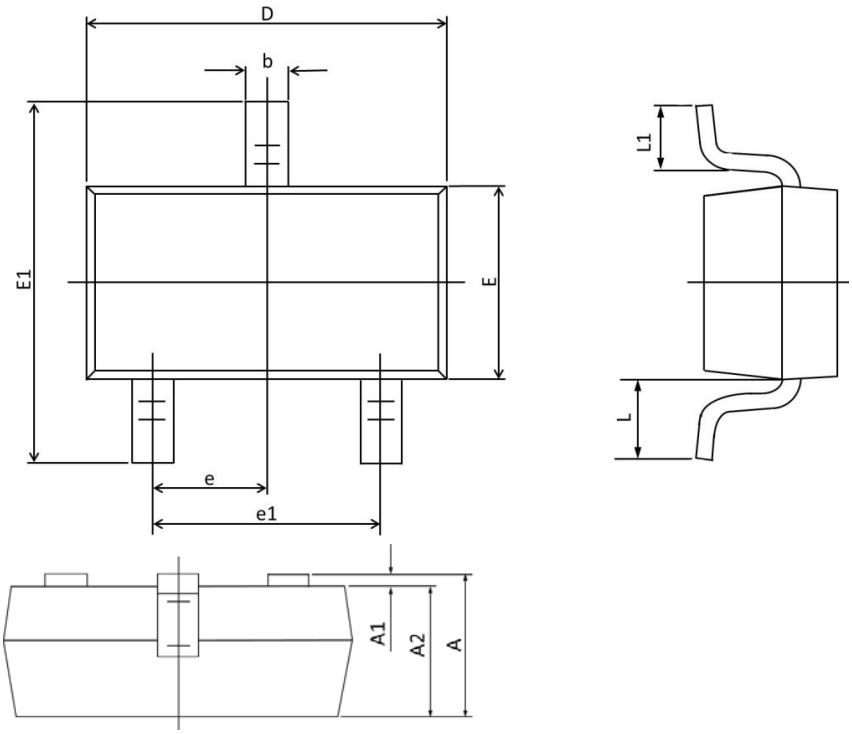


Figure 10. Drain Current vs. Case Temperature

Package Outline Dimensions (SOT-23)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.200	0.035	0.047
A1	0.000	0.100	0.000	0.004
A2	0.900	1.150	0.035	0.045
b	0.300	0.500	0.012	0.020
D	2.800	3.040	0.110	0.120
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.95 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.55 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020

Order Information

Device	Package	Marking	Quantity	Carrier
GSFC138A	SOT-23	S138	3,000pcs / Reel	Tape & Reel