GOOD-ARK SEMICONDUCTOR

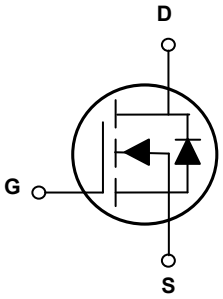
GSFU6512

650V N-Channel MOSFET

Main Product Characteristics

BV_{DSS}	650V
$R_{DS(ON)}$	0.78Ω
I_D	12A

TO-220F



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

RoHS Compliant

Description

The GSFU6512 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°C unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	±30	V
Drain Current-Continuous (T_C=25°C)	I_D	12	A
Drain Current-Continuous (T_C=100°C)		7.6	
Drain Current-Pulsed[1]	I_{DM}	48	A
Single Pulse Avalanche Energy[2]	E_{AS}	470	mJ
Single Pulse Avalanche Current[2]	I_{AS}	9.7	A
Power Dissipation (T_C=25°C)	P_D	60	W
Power Dissipation-Derate above 25°C		0.48	W/°C
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.1	°C/W
Operating Junction Temperature Range	T_J	-55 To +150	°C
Storage Temperature Range	T_{STG}	-55 To +150	°C

Electrical Characteristics (T_J=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	650	-	-	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=650V, V_{GS}=0V, T_J=25°C	-	-	1	μA
		V_{DS}=520V, V_{GS}=0V, T_J=125°C	-	-	20	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±30V, V_{DS}=0V	-	-	±100	nA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=3A	-	0.65	0.78	Ω
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D =250uA	2.5	3.5	4.5	V
Forward Transconductance	g_{fs}	V_{DS}=30V, I_D=6A	-	8	-	S
Dynamic and Switching Characteristics						
Total Gate Charge[3,4]	Q_g	V_{DS}=350V, I_D=6A V_{GS}=10V	-	39	60	nC
Gate-Source Charge[3,4]	Q_{gs}		-	8	15	
Gate-Drain Charge[3,4]	Q_{gd}		-	16	25	
Turn-On Delay Time[3,4]	$t_{d(on)}$	V_{DD}=350V, R_G=25Ω V_{GS}=10V, I_D=6A	-	35	55	nS
Rise Time[3,4]	t_r		-	40	60	
Turn-Off Delay Time[3,4]	$t_{d(off)}$		-	105	160	
Fall Time[3,4]	t_f		-	40	60	
Input Capacitance	C_{lss}	V_{DS}=25V, V_{GS}=0V, F=1MHz	-	1880	2800	pF
Output Capacitance	C_{oss}		-	140	210	
Reverse Transfer Capacitance	C_{rss}		-	5	10	
Gate Resistance	R_g	V_{GS}=0V, V_{DS}=0V, F=1MHz	-	1.6	-	Ω
Drain-Source Diode Characteristics and Maximum Ratings						
Continuous Source Current	I_S	V_G=V_D=0V, Force Current	-	-	12	A
Pulsed Source Current	I_{SM}		-	-	24	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=12A, T_J=25°C	-	-	1.3	V
Reverse Recovery Time	t_{rr}	V_R=400V, I_S=10A di/dt=100A/μs T_J=25°C	-	400	-	nS
Reverse Recovery Charge	Q_{rr}		-	4.8	-	μC

Note:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2. V_{DD}=50V, V_{GS}=10V, L=10mH, I_{AS}=9.7A, R_G=25Ω,starting T_J=25°C.
3. Pulse test: pulse width ≤300us,duty cycle≤2%.
4. Essentially independent of operation temperature.

Typical Electrical and Thermal Characteristic Curves

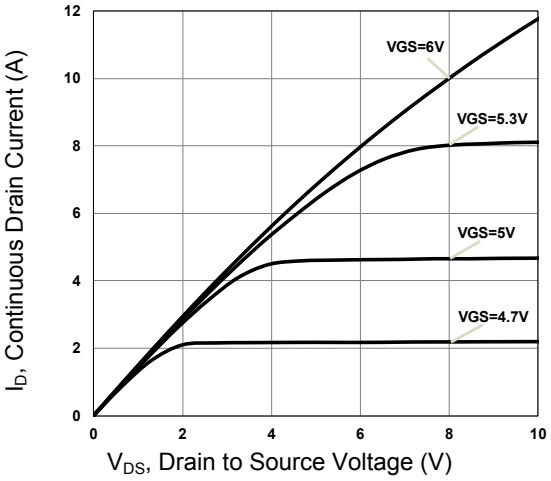


Figure 1. Typical Output Characteristics

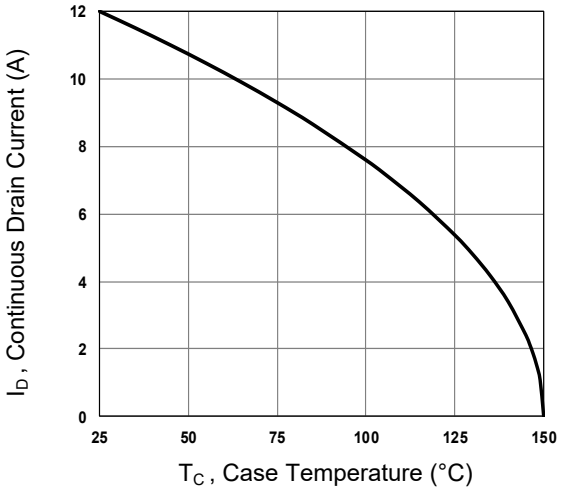


Figure 2. Continuous Drain Current vs. T_C

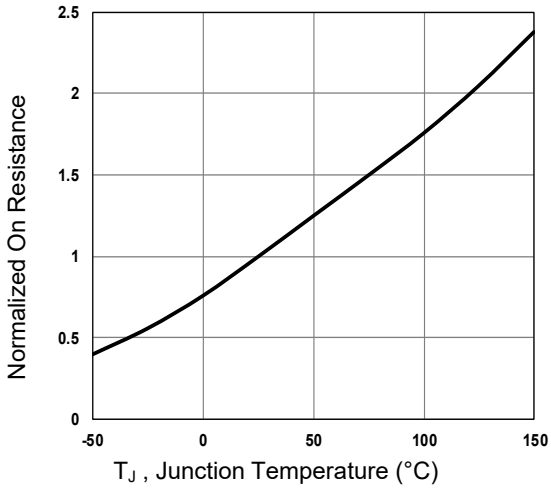


Figure 3. Normalized R_{DSON} vs. T_J

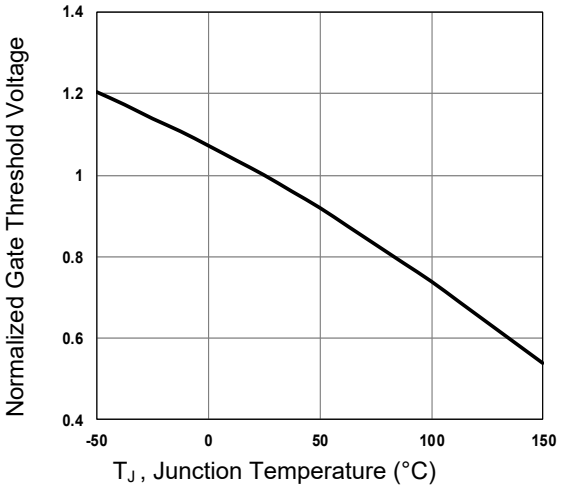


Figure 4. Normalized V_{th} vs. T_J

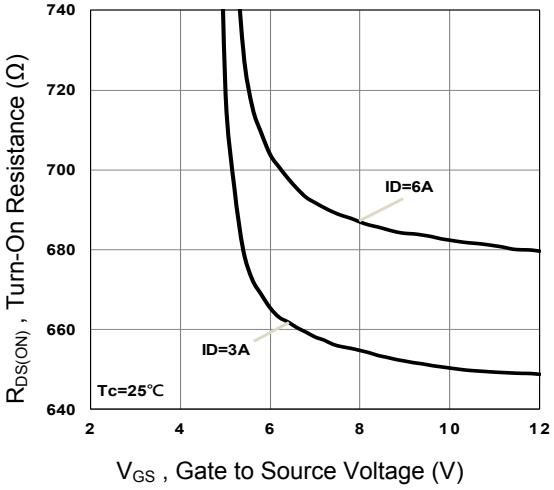


Figure 5. Turn-On Resistance vs. V_{GS}

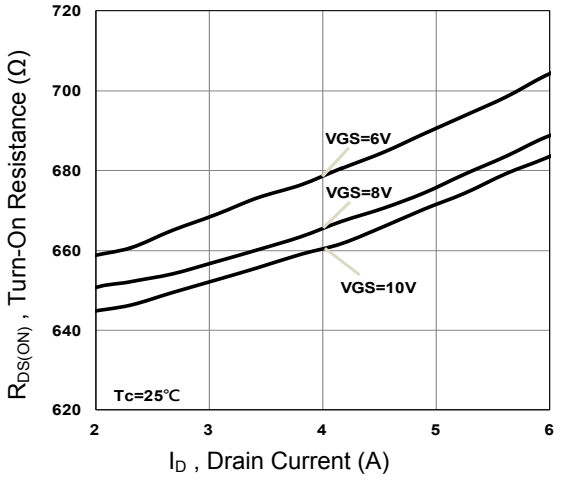


Figure 6. Turn-On Resistance vs. I_D

Typical Electrical and Thermal Characteristic Curves

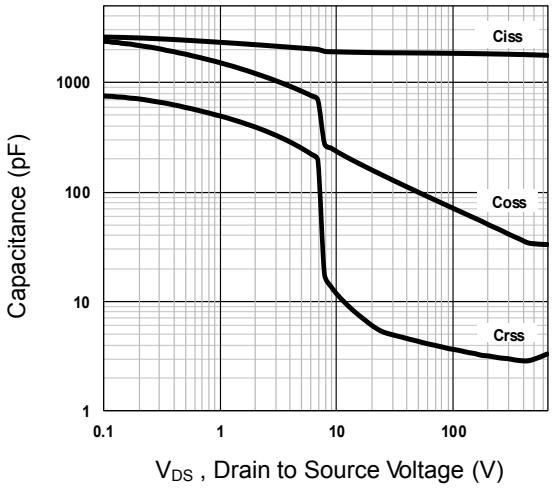


Figure 7. Capacitance Characteristics

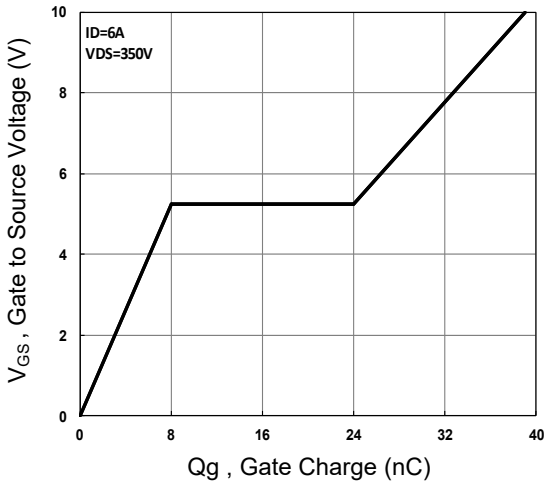


Figure 8. Gate Charge Characteristics

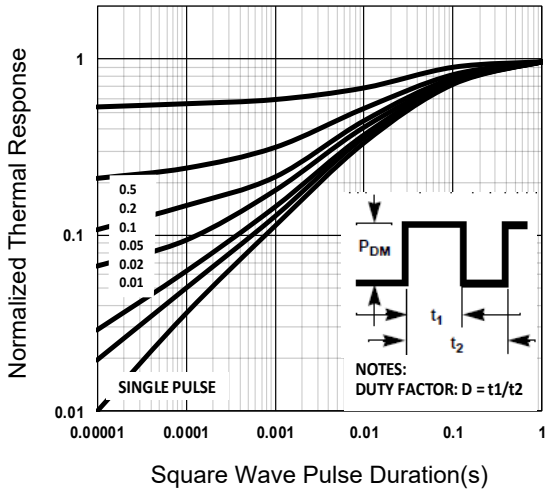


Figure 9. Normalized Transient Impedance

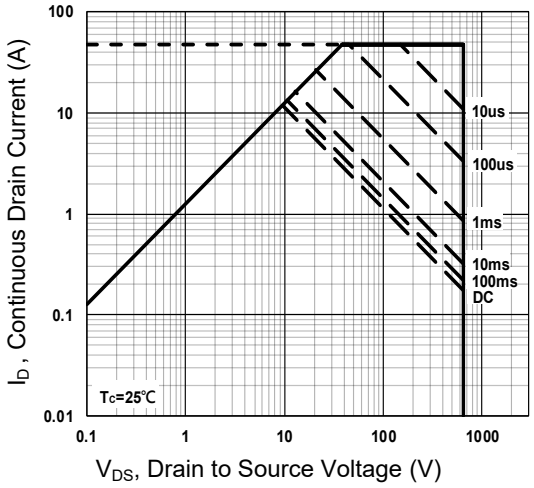


Figure 10. Maximum Safe Operation Area

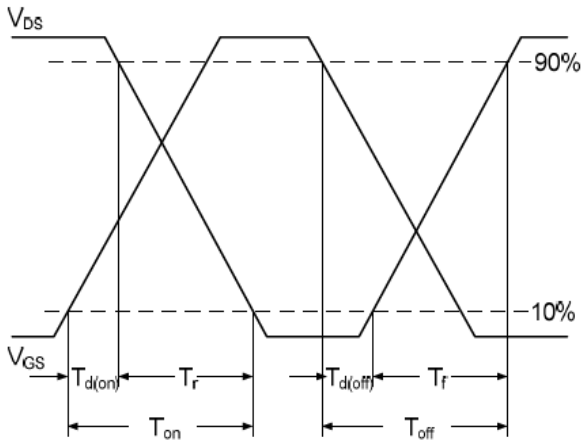


Figure 11. Switching Time Waveform

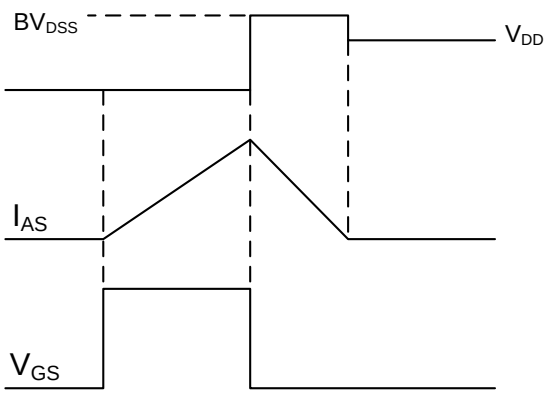
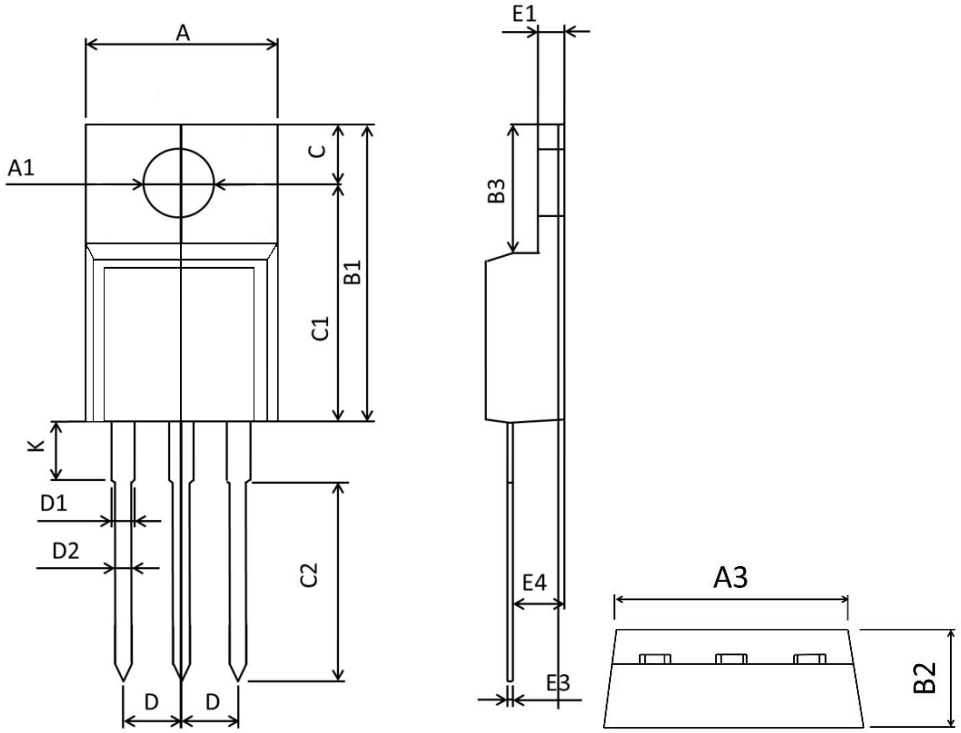


Figure 12. EAS Waveform

Package Outline Dimensions (TO-220F)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	9.860	10.460	0.389	0.411
A1	3.100	3.500	0.122	0.138
B1	15.450	16.300	0.608	0.642
B2	4.400	5.000	0.173	0.197
B3	6.280	7.100	0.247	0.280
C	3.100	3.500	0.122	0.138
C1	12.270	12.870	0.483	0.507
C2	9.600	10.520	0.378	0.414
D	2.540BSC		0.1BSC	
D1	1.070	1.470	0.042	0.058
D2	0.600	1.000	0.024	0.039
K	2.800	3.500	0.110	0.138
E1	2.340	2.740	0.092	0.108
E3	0.350	0.650	0.014	0.026
E4	2.460	2.960	0.097	0.117