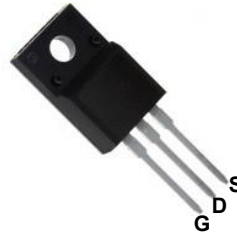
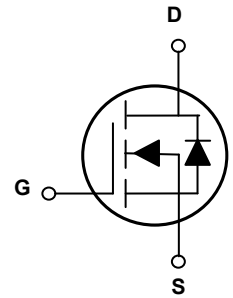


Main Product Characteristics

BV_{DSS}	650V
$R_{DS(ON)}$	0.8 Ω
I_D	10A



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



Description

The GSFU6510 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}	650	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current @ Steady-State ¹ ($T_C=25^\circ\text{C}$)	I_D	10	A
Continuous Drain Current @ Steady-State ($T_C=70^\circ\text{C}$)		5.5	
Drain Current-Pulsed ²	I_{DM}	40	A
Single Pulse Avalanche Energy ³	E_{AS}	650	mJ
Power Dissipation ($T_C=25^\circ\text{C}$)	P_D	40	W
Linear Derating Factor ($T_C=25^\circ\text{C}$)		0.32	
Junction-to-Ambient (PCB Mounted, Steady-State) ⁴	$R_{\theta JA}$	120	$^\circ\text{C}/\text{W}$
Junction-to-Case	$R_{\theta JC}$	2.2	$^\circ\text{C}/\text{W}$
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 ($T_C=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
On/Off Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	650	-	-	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V$	-	-	1	μA
		$T_J=125^\circ\text{C}$	-	-	50	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 30V$	-	-	± 100	nA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=10A$	-	0.74	0.8	m Ω
Gate Resistance	R_g	$F=1\text{MHz}$	-	1.9	-	Ω
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2.1	3	3.9	V
Dynamic and Switching Characteristics						
Total Gate Charge	Q_g	$V_{DS}=480V, I_D=10A, V_{GS}=10V$	-	21	-	nC
Gate-Source Charge	Q_{gs}		-	7.8	-	
Gate-Drain Charge	Q_{gd}		-	6.4	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DS}=300V, R_{GEN}=25\Omega, V_{GS}=10V, I_D=10A$	-	41	-	nS
Rise Time	t_r		-	73.4	-	
Turn-Off Delay Time	$t_{d(off)}$		-	53	-	
Fall Time	t_f		-	38	-	
Input Capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V, F=1\text{MHz}$	-	1940	-	pF
Output Capacitance	C_{oss}		-	131	-	
Reverse Transfer Capacitance	C_{rss}		-	3.5	-	
Source-Drain Ratings and Characteristics						
Continuous Source Current	I_S	MOSFET symbol showing the integral reverse p-n junction diode.	-	-	10	A
Pulsed Source Current	I_{SM}		-	-	40	A
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=10A$	-	-	1.4	V
Reverse Recovery Time	t_{rr}	$I_F=10A, di/dt=100A/\mu s, T_J=25^\circ\text{C}$	-	571	-	nS
Reverse Recovery Charge	Q_{rr}		-	4.6	-	μC

Note:

1. Calculated continuous current based on maximum allowable junction temperature.
2. Repetitive rating: Pulsed width limited by maximum junction temperature.
3. $V_{DD}=150V, L=30mH, I_{AS}=5.8A, T_J=25^\circ\text{C}$.
4. Device mounted on FR-4 PCB, 1inchx0.85inchx0.062inch.

Typical Electrical and Thermal Characteristic Curves

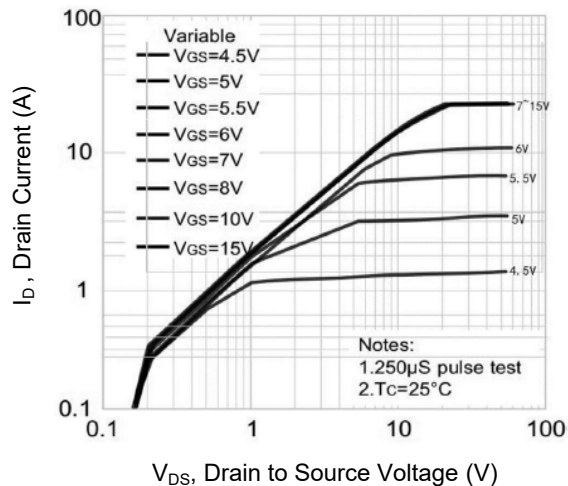


Figure 1. Typical Output Characteristics

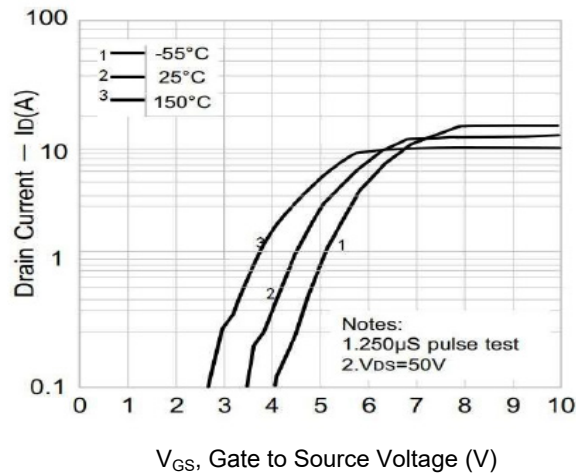


Figure 2. Transfer Characteristics

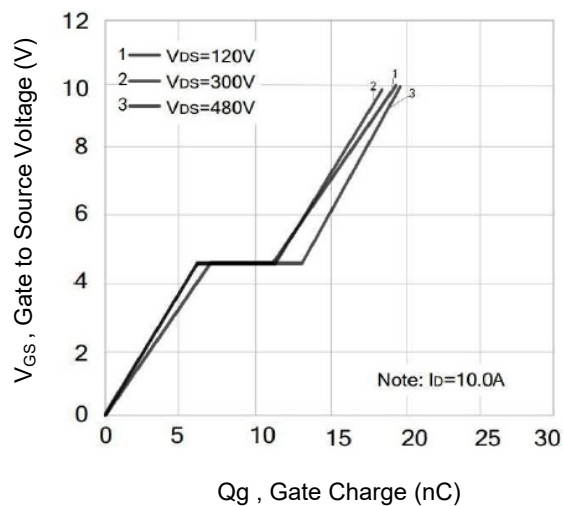


Figure 3. Gate Charge Waveform

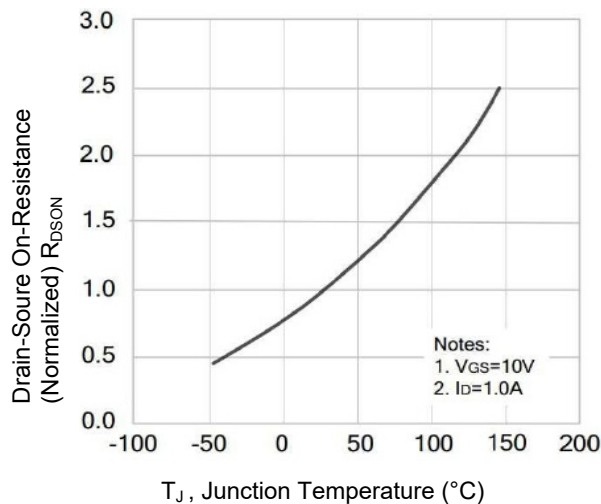


Figure 4. Normalized On Resistance vs. T_J

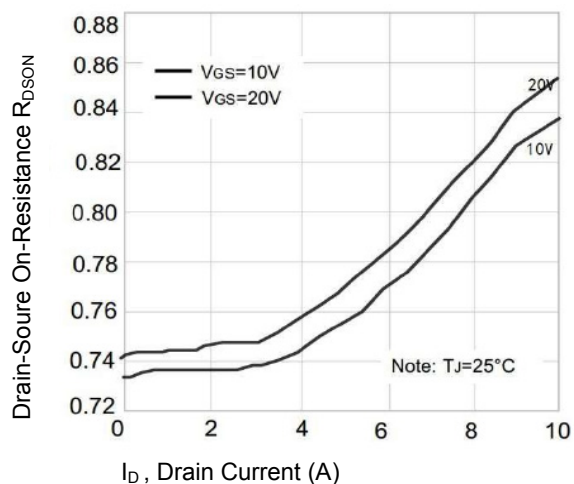


Figure 5. Drain-Source On-Resistance

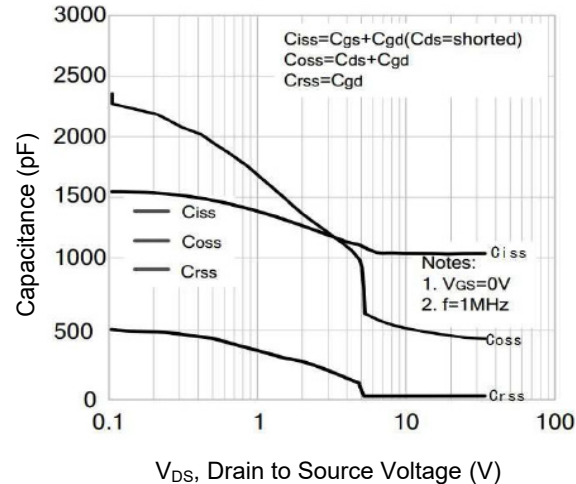


Figure 6. Capacitance Vs. Drain-to-Source Voltage

Typical Electrical and Thermal Characteristic Curves

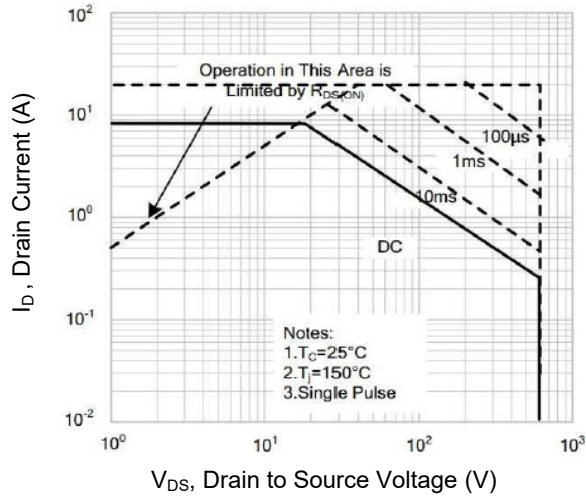


Figure 7. Safe Operation Area

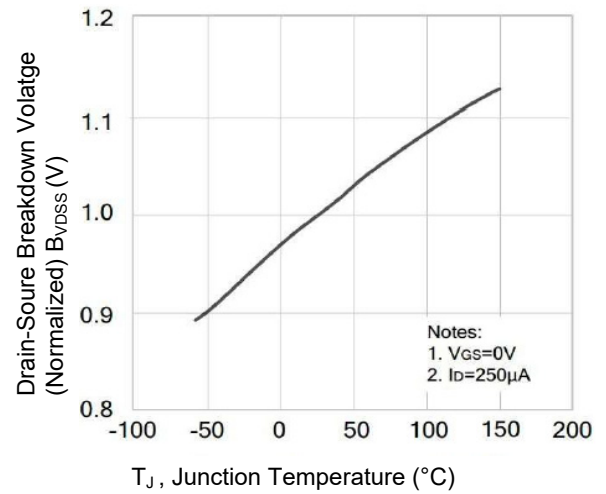


Figure 8. Normalized B_{VDSS} vs. T_J

Typical Electrical and Thermal Characteristic Curves

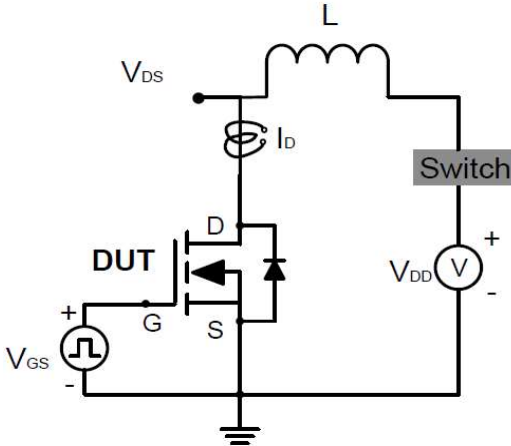
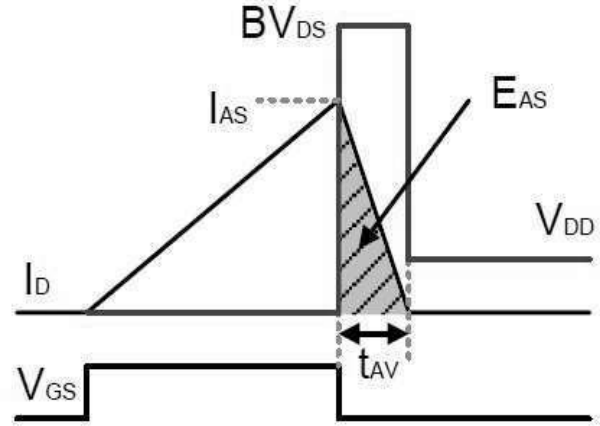


Figure 9. EAS Test Circuit & Waveforms



Switch Time Test Circuit:

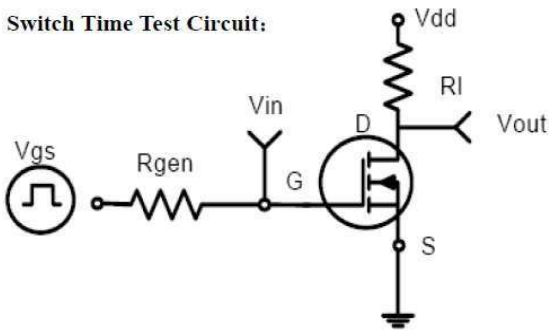


Figure 10. Resistive Switching Test Circuit & Waveforms

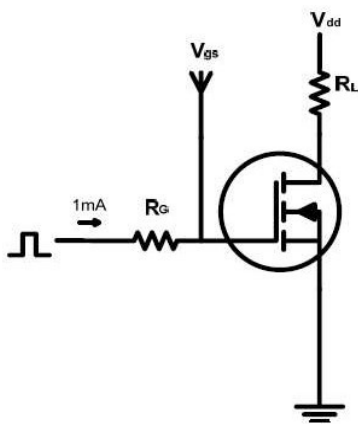
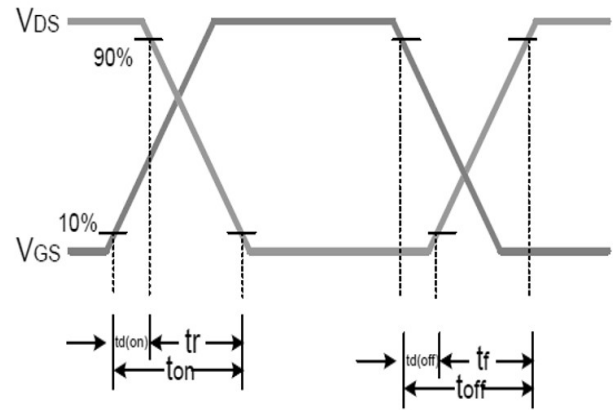
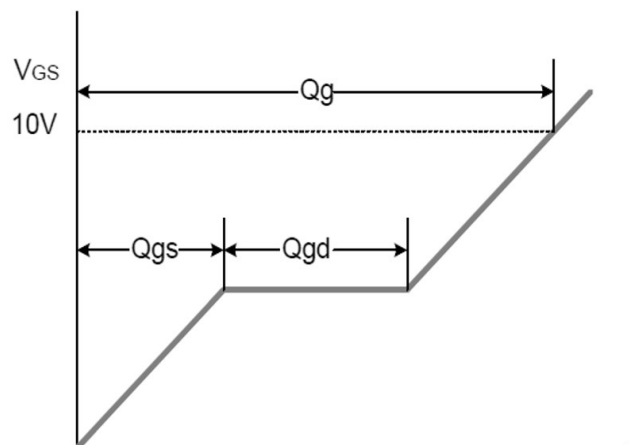
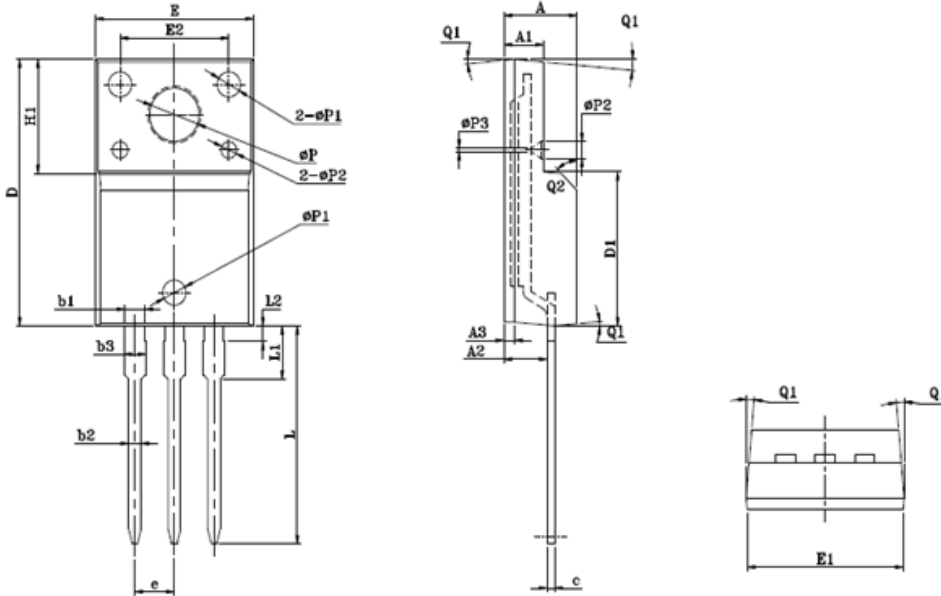


Figure 11. Gate Charge Test Circuit & Waveform



Package Outline Dimensions (TO-220F)



Symbol	Dimension In Millimeters			Dimension In Inches		
	Min	Nom	Max	Min	Nom	Max
E	9.960	10.160	10.360	0.392	0.400	0.408
E1	9.840	10.040	10.240	0.387	0.395	0.403
E2	6.800	7.000	7.200	0.268	0.276	0.283
A	4.600	4.700	4.800	0.181	0.185	0.189
A1	2.440	2.540	2.640	0.096	0.100	0.104
A2	2.660	2.760	2.860	0.105	0.109	0.113
A3	0.600	0.700	0.800	0.024	0.028	0.031
c	-	0.500	-	-	0.020	-
D	15.780	15.870	15.980	0.621	0.625	0.629
D1	8.970	9.170	9.370	0.353	0.361	0.369
H1	6.500	6.700	6.800	0.256	0.264	0.268
e	2.54BSC			0.10BSC		
φP	3.080	3.180	3.280	0.121	0.125	0.129
φP1	1.400	1.500	1.600	0.055	0.059	0.063
φP2	0.900	1.000	1.100	0.035	0.039	0.043
φP3	0.100	0.200	0.300	0.004	0.008	0.012
L	12.780	12.980	13.180	0.503	0.511	0.519
L1	2.970	3.170	3.370	0.117	0.125	0.133
L2	0.830	0.930	1.030	0.033	0.037	0.041
Q1	3 ⁰	5 ⁰	7 ⁰	3 ⁰	5 ⁰	7 ⁰
Q2	43 ⁰	45 ⁰	47 ⁰	43 ⁰	45 ⁰	47 ⁰
b1	1.180	1.280	1.380	0.046	0.050	0.054
b2	0.760	0.800	0.840	0.030	0.031	0.033
b3	-	-	1.420	-	-	0.056