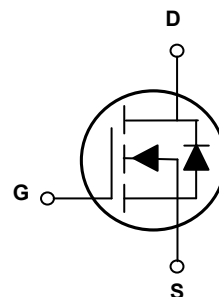


Main Product Characteristics

$V_{(BR)DSS}$	650V
$R_{DS(ON)}$	0.65Ω (typ)
I_D	13A



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 GSFU6513 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_{DSS}	650	V
Gate-Source Voltage		V_{GSS}	±30	V
Continuous Drain Current	$T_C = 25^{\circ}\text{C}$	I_D	13	A
	$T_C = 100^{\circ}\text{C}$		9	A
Pulsed Drain Current ¹		I_{DM}	50	A
Single Pulsed Avalanche Energy ²		E_{AS}	786	mJ
Power Dissipation	$T_C = 25^{\circ}\text{C}$	P_D	51	W
Thermal Resistance, Junction to Case		$R_{\theta JC}$	2.44	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to Ambient		$R_{\theta JA}$	62.5	$^{\circ}\text{C/W}$
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^{\circ}\text{C}$

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

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Off Characteristic						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =250μA	650	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 650V, V _{GS} = 0V, T _J = 25°C	-	-	1	
		V _{DS} = 520V, V _{GS} = 0V, T _J = 125°C	-	-	50	μA
Gate to Body Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} = ±30V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D =250μA	2	-	4	V
Static Drain-Source on-Resistance ³	R _{DS(on)}	V _{GS} =10V, I _D =6.0A	-	0.65	0.8	Ω
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} = 25V, V _{GS} = 0V, f = 1.0MHz	-	1746	-	pF
Output Capacitance	C _{oss}		-	152	-	pF
Reverse Transfer Capacitance	C _{rss}		-	4.5	-	pF
Total Gate Charge	Q _g	V _{DD} = 520V, I _D =13A, V _{GS} = 10V	-	24.2	-	nC
Gate-Source Charge	Q _{gs}		-	7.9	-	nC
Gate-Drain(“Miller”) Charge	Q _{gd}		-	7.5	-	nC
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} = 325V, I _D = 12A, R _G = 25Ω	-	38	-	ns
Turn-on Rise Time	t _r		-	62	-	ns
Turn-off Delay Time	t _{d(off)}		-	80.5	-	ns
Turn-off Fall Time	t _f		-	46.7	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
Maximum Continuous Drain to Source Diode Forward Current	I _S		-	-	13	A
Maximum Pulsed Drain to Source Diode Forward Current	I _{SM}		-	-	50	A
Drain to Source Diode Forward Voltage	V _{SD}	V _{GS} = 0V, I _{SD} =13A	-	-	1.4	V
Reverse Recovery Time	t _{rr}	V _{GS} =0V, I _S =13A, di/dt=100A/μs	-	590	-	ns
Reverse Recovery Charge	Q _{rr}		-	5.62	-	μC

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. $I_{AS}=6.7A, V_{DD}=140V, R_G=25\Omega$, Starting $T_J=25^{\circ}\text{C}$

3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 1\%$

Typical Electrical and Thermal Characteristic Curves

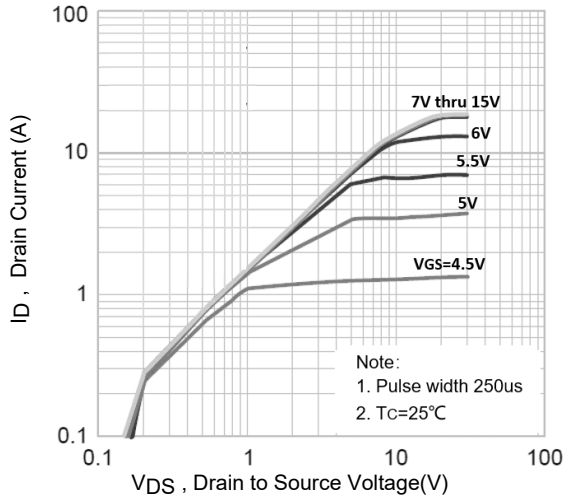


Figure 1. Output Characteristics

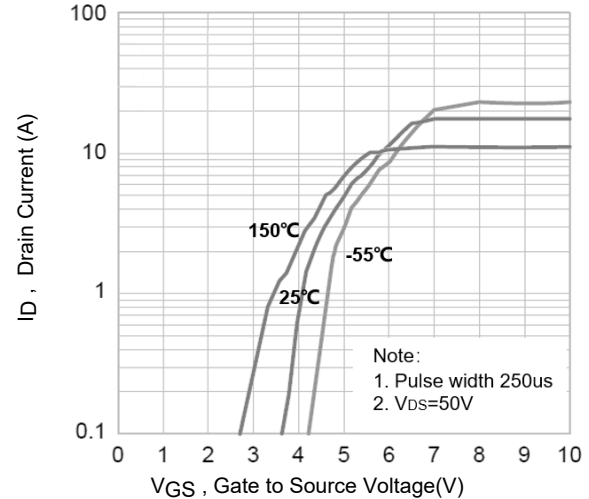


Figure 2. Transfer Characteristics

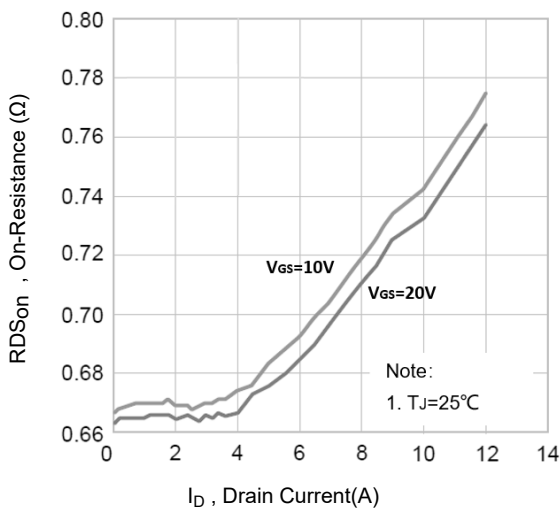


Figure 3. RDSon vs. Drain Current

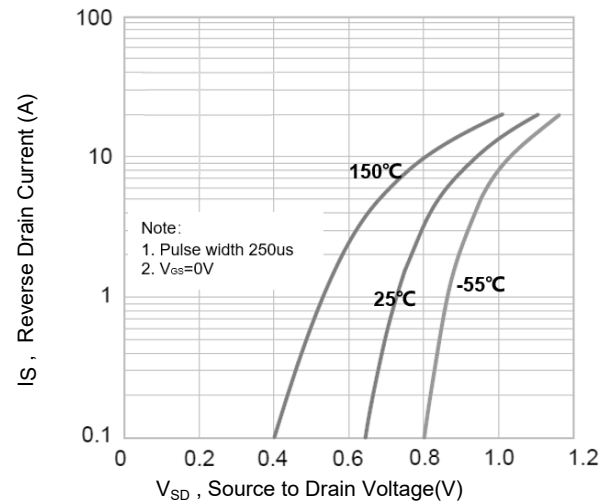


Figure 4. Body Diode Characteristics

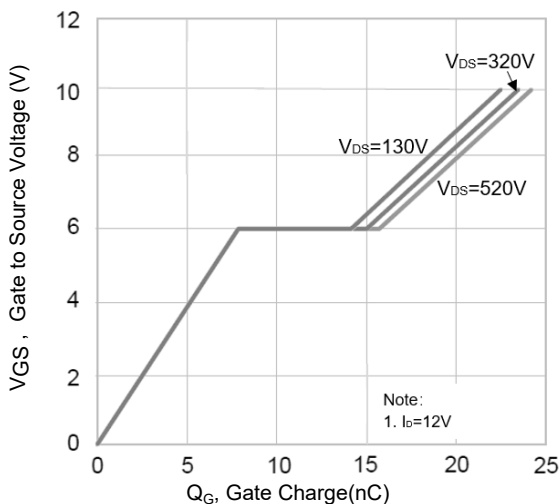


Figure 5. Gate Charge

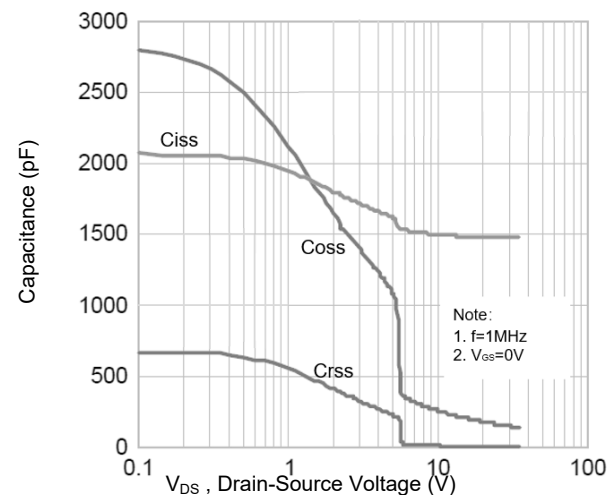


Figure 6. Capacitance Characteristics

Typical Electrical and Thermal Characteristic Curves

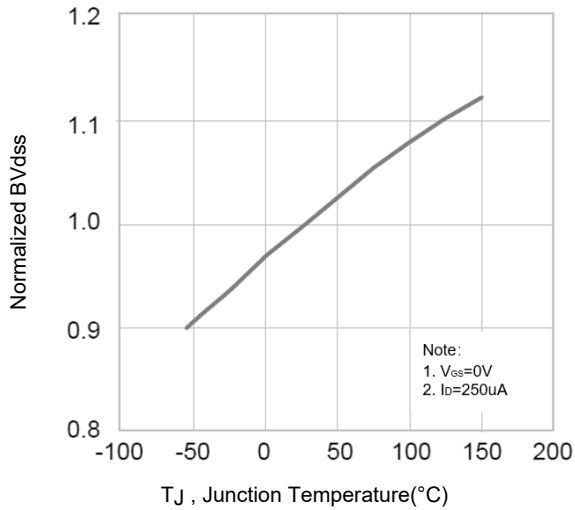


Figure 7. Normalized BV_{dss} vs. Junction Temperature

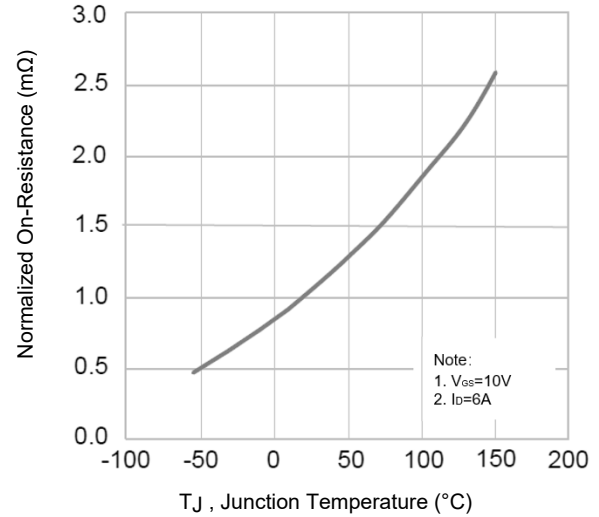


Figure 8. Normalized R_{DSon} vs. Junction Temperature

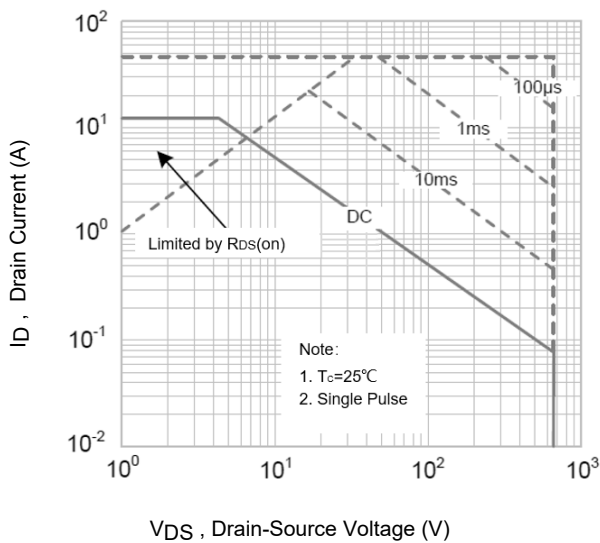


Figure 9. Safe Operation Area

Test Circuit & Waveform

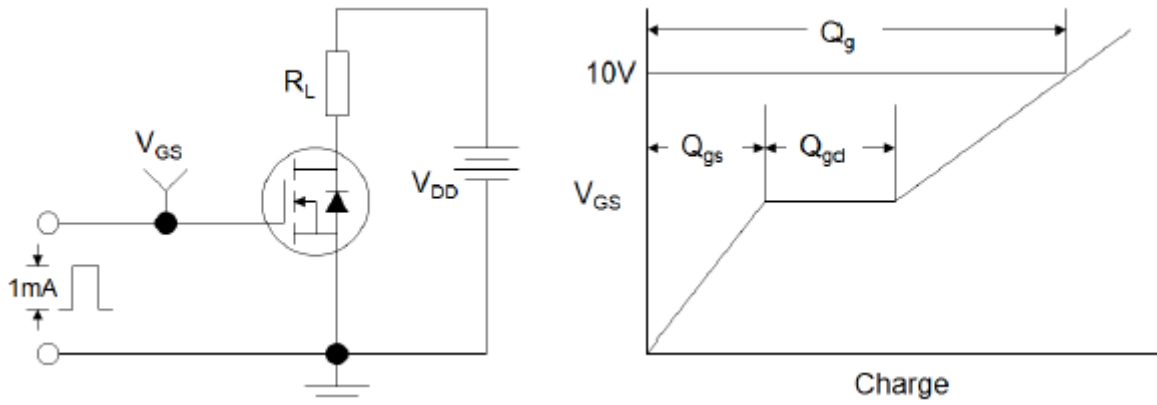


Figure 10. Gate Charge Test Circuit & Waveform

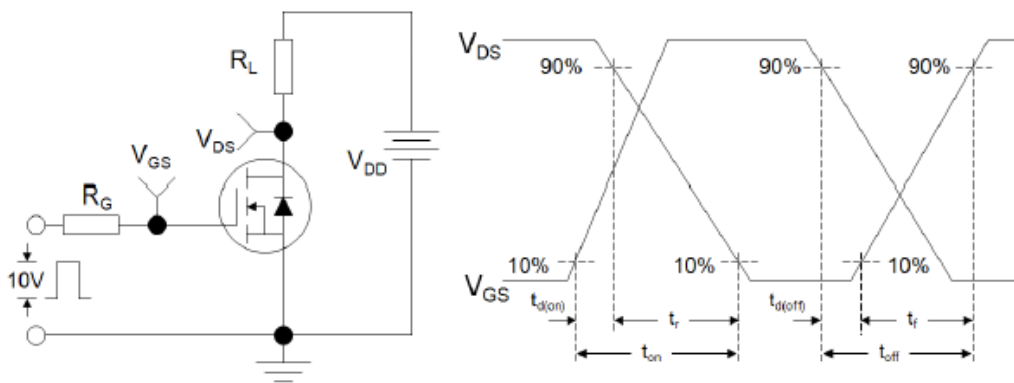


Figure 11. Resistive Switching Test Circuit & Waveforms

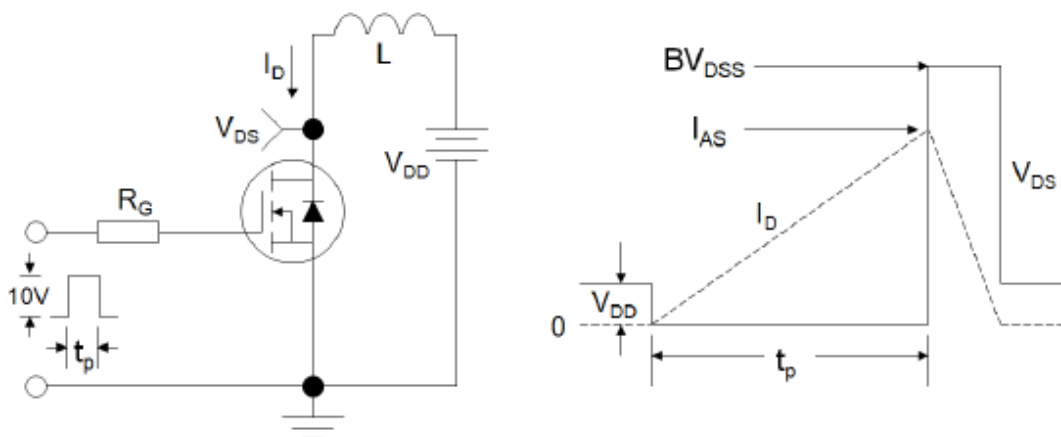
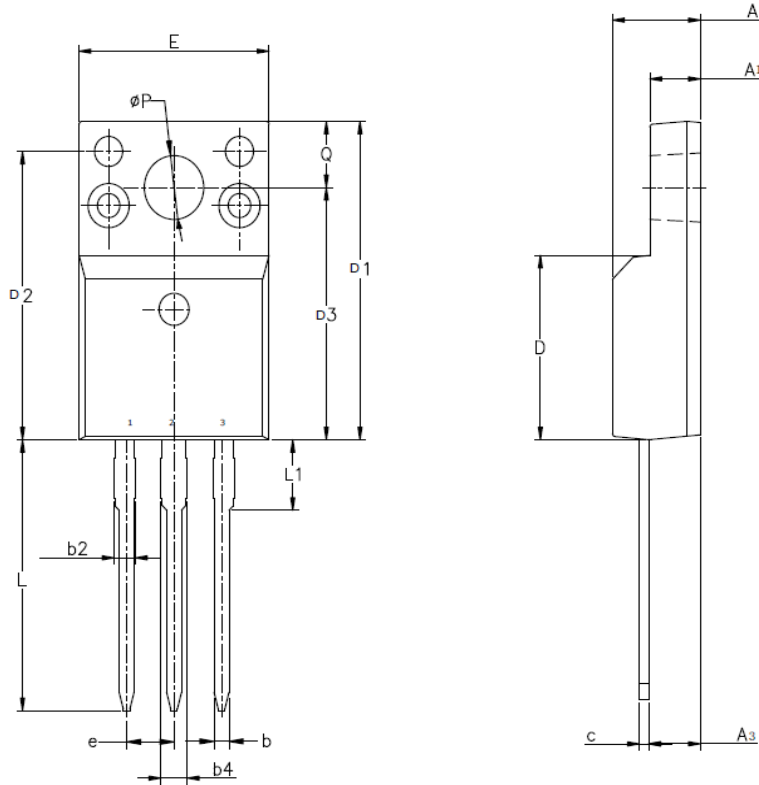


Figure 12. Unclamped Inductive Switching Test Circuit & Waveforms

Package Outline Dimensions

TO-220F



Ref.	Dimensions						
	Millimeters						
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	4.50		4.90	D	8.80		9.39
A1	2.45		2.83	D1	15.8		16.2
A3	2.56		3.00	D2	14.1		14.6
b	0.74	0.80	0.9	D3	12.3		12.9
b2	0.96		1.19	E	9.80		10.40
b4	1.14		1.70	L	13.20		13.70
c	0.46		0.65	L1	3.37		3.67
Q	3.20		3.40	ΦP	3.10		3.60
e	2.54 BSC						