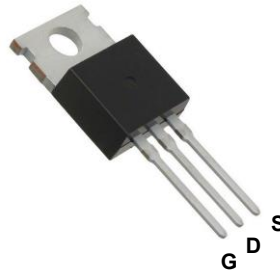
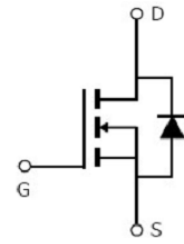


Main Product Characteristics

V_{DSS}	30V
$R_{DS(on)}$	3.0m Ω
I_D	150A



TO-220



Schematic Diagram

Features and Benefits

- High avalanche capabilities
- High ESD capabilities
- Ultra low R_{ds(on)}
- Excellent heat dissipation



Description

The GSFH03150 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	Value	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	150	A
Drain Current-Continuous(T _C =100°C)	$I_D(100^\circ C)$	105	A
Pulsed Drain Current ¹	I_{DM}	600	A
Maximum Power Dissipation	P_D	130	W
Derating Factor		0.87	W/°C
Single pulse avalanche energy ⁵	E_{AS}	1700	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	°C
Thermal Resistance, Junction-to-Case ²	$R_{\theta JC}$	1.15	°C/W

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

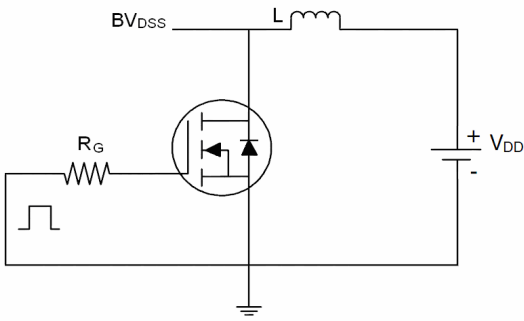
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	30	35	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics ³						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	1.7	2.5	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$	-	2.3	3.0	m Ω
		$V_{GS}=4.5V, I_D=10A$	-	3.2	4.0	
Forward Transconductance	g_{FS}	$V_{DS}=10V, I_D=20A$	32	-	-	S
Dynamic Characteristics ⁴						
Input Capacitance	C_{iss}	$V_{DS}=15V, V_{GS}=0V,$ $F=1.0MHz$	-	5000	-	PF
Output Capacitance	C_{oss}		-	1135	-	PF
Reverse Transfer Capacitance	C_{rss}		-	563	-	PF
Switching Characteristics ⁴						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=15V, I_D=2A, R_L=15\Omega$ $V_{GS}=10V, R_G=2.5\Omega$	-	26	-	nS
Turn-on Rise Time	t_r		-	24	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	91	-	nS
Turn-Off Fall Time	t_f		-	39	-	nS
Total Gate Charge	Q_g	$V_{DS}=15V, I_D=30A,$ $V_{GS}=10V$	-	38	-	nC
Gate-Source Charge	Q_{gs}		-	9	-	nC
Gate-Drain Charge	Q_{gd}		-	13	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ³	V_{SD}	$V_{GS}=0V, I_S=150A$	-	-	1.2	V
Diode Forward Current ²	I_S		-	-	150	A
Reverse Recovery Time	t_{rr}	$T_J = 25^\circ\text{C}, I_F = 20A$ $di/dt = 100A/\mu s^3$	-	42	-	nS
Reverse Recovery Charge	Q_{rr}		-	39	-	nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

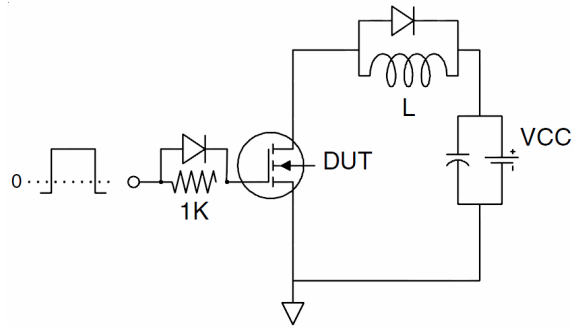
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed only by design
5. E_{AS} condition : $T_J=25^\circ\text{C}, V_{DD}=20V, V_G=10V, L=1mH, R_G=25\Omega, I_{AS}=58.5A$

Test Circuits and Waveforms

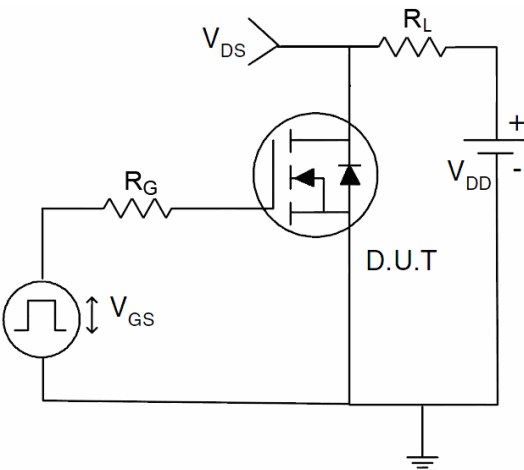
EAS Test Circuit:



Gate charge test circuit:



Switching Time Test Circuit:



Typical Electrical and Thermal Characteristic Curves

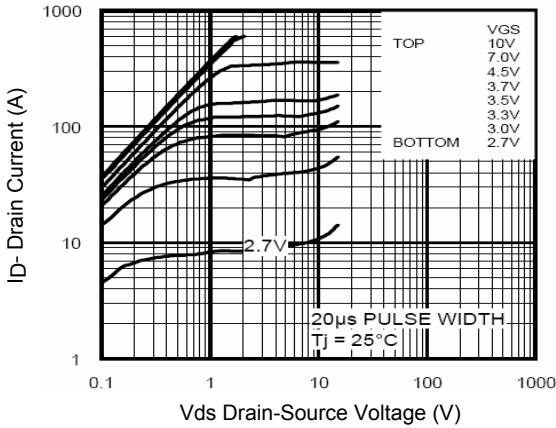


Figure 1. Output Characteristics

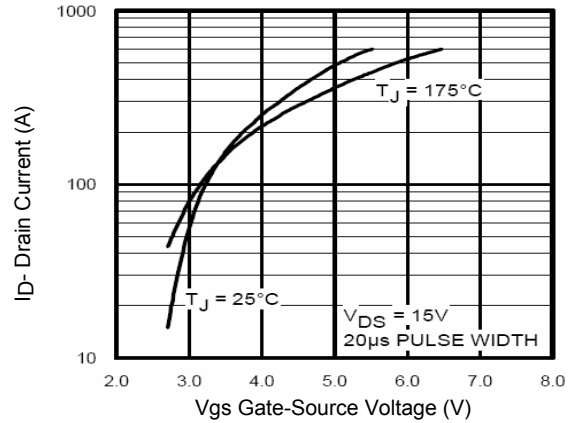


Figure 2. Transfer Characteristics

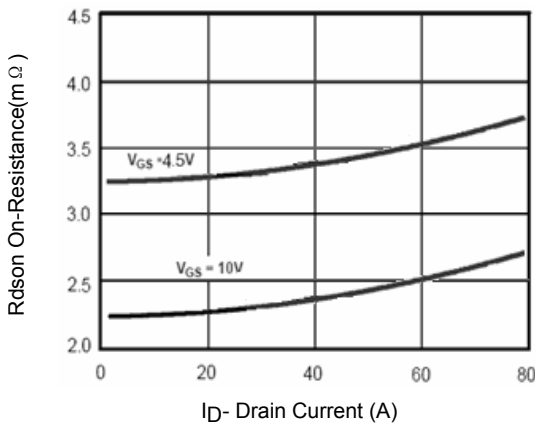


Figure 3. Rdson- Drain Current

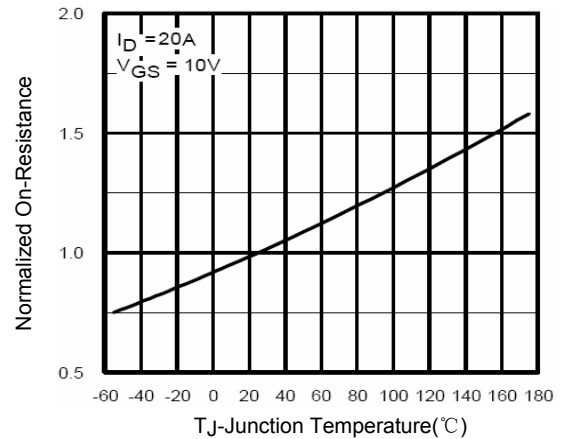


Figure 4. Rdson-Junction Temperature

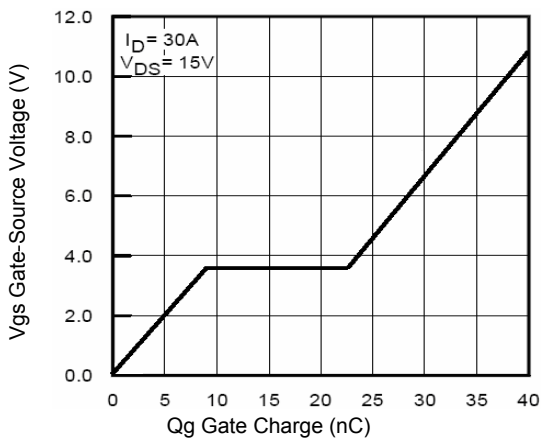


Figure 5. Gate Charge

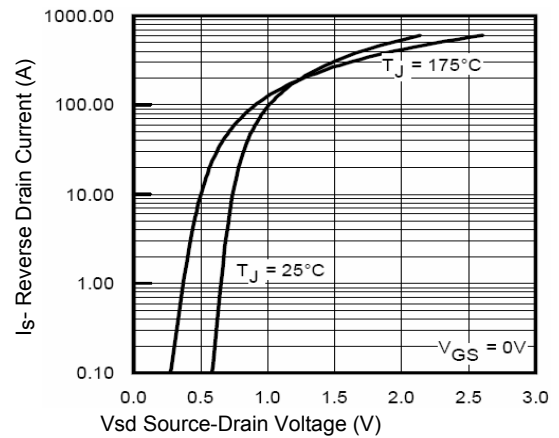


Figure 6. Source- Drain Diode Forward Voltage

Typical Electrical and Thermal Characteristic Curves

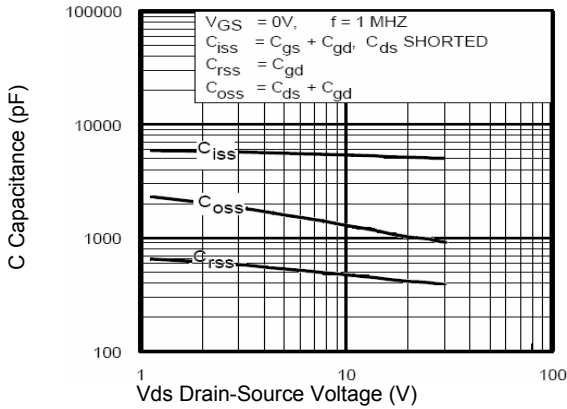


Figure 7. Capacitance vs Vds

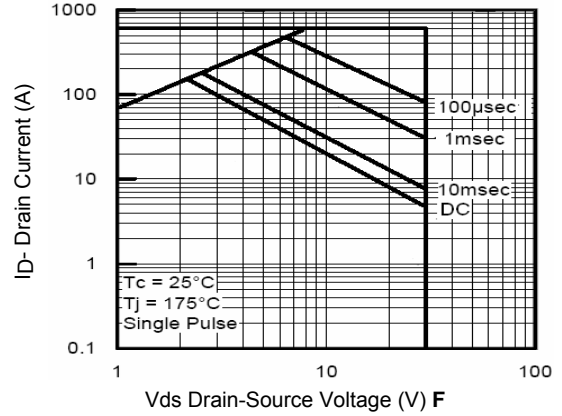


Figure 8. Safe Operation Area

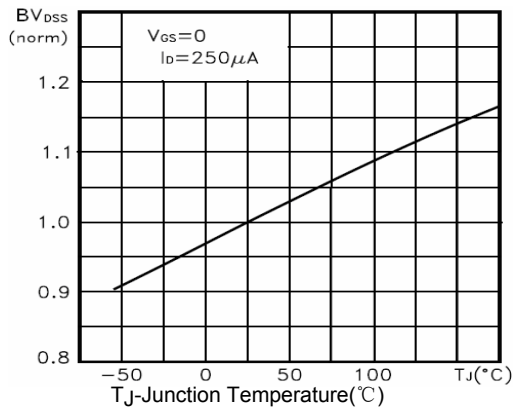


Figure 9. BV_{DSS} vs Junction Temperature

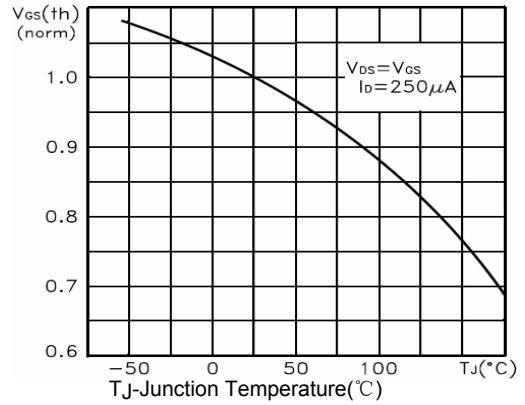


Figure 10. $V_{GS(th)}$ vs Junction Temperature

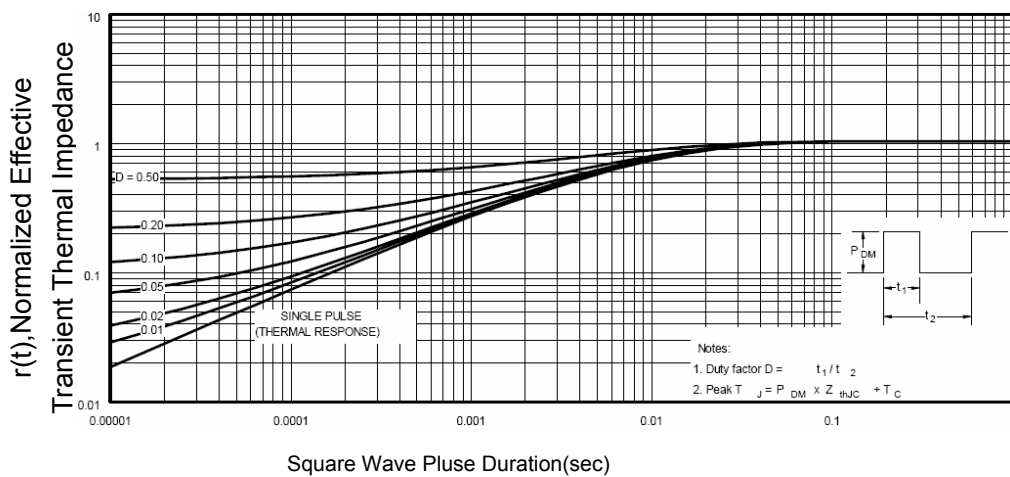
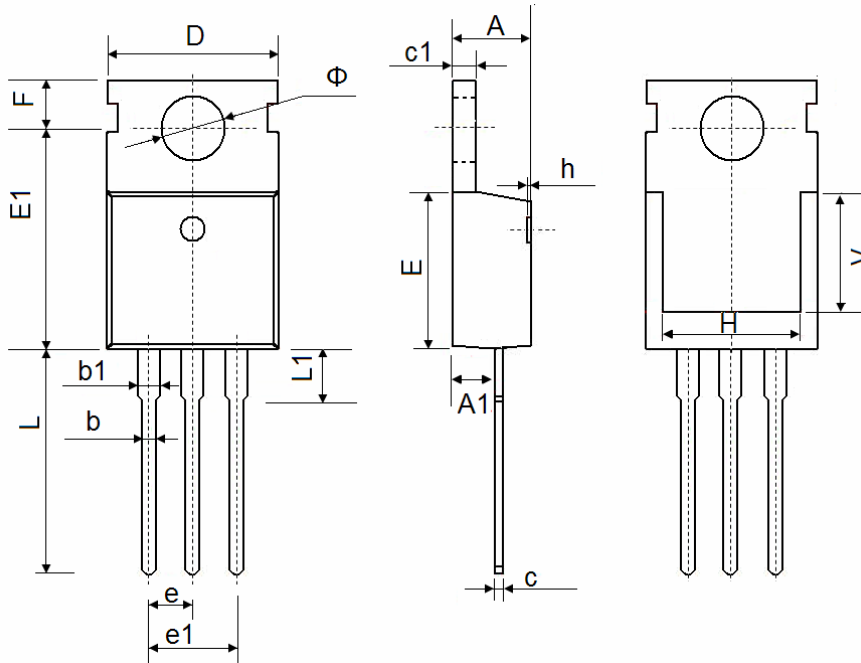


Figure 11. Normalized Maximum Transient Thermal Impedance

Package Outline Dimensions

TO-220



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.9500	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	7.500 REF.		0.295 REF.	
Φ	3.400	3.800	0.134	0.150