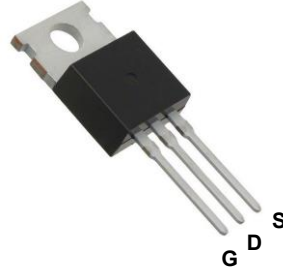
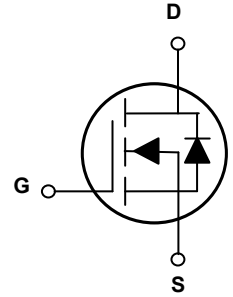


Main Product Characteristics

$V_{(BR)DSS}$	650V
$R_{DS(ON)}$	89mΩ(Typ.)
	99mΩ(Max.)
I_D	38A



TO-220



Schematic Diagram

Features and Benefits

- Advanced MOSFET process technology
- Ideal for battery operated systems, load switching, power converters and other general purpose applications
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery



Description

The SSFH6538 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 and Thermal Characteristics

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage ($V_{GS}=0V$)	V_{DS}	650	V
Gate-Source Voltage ($V_{DS}=0V$) AC ($f>1\text{ Hz}$)	V_{GS}	± 30	V
Continuous Drain Current at $T_C=25^\circ\text{C}$	$I_{D(DC)}$	38	A
Continuous Drain Current at $T_C=100^\circ\text{C}$	$I_{D(DC)}$	24	A
Pulsed Drain Current ¹	$I_{DM(pluse)}$	152	A
Maximum Power Dissipation($T_C=25^\circ\text{C}$)	P_D	322	W
Derate above 25°C		2.58	W/ $^\circ\text{C}$
Single Pulse Avalanche Energy ²	E_{AS}	841	mJ
Avalanche Current ¹	I_{AR}	7	A
Repetitive Avalanche Energy, t_{AR} Limited by T_{JMAX} ¹	E_{AR}	3.9	mJ
Drain Source Voltage Slope, $V_{DS}\leq 480V$,	dv/dt	50	V/nS
Reverse Diode dv/dt , $V_{DS}\leq 480V$, $I_{SD}<I_D$	dv/dt	50	V/nS
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$
Thermal Resistance, Junction-to-Case (Maximum)	$R_{\theta JC}$	0.39	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient (Maximum)	$R_{\theta JA}$	62	$^\circ\text{C/W}$

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
On/off States						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=500\mu A$	650	--	--	V
Zero Gate Voltage Drain Current($T_C=25^\circ\text{C}$)	I_{DSS}	$V_{DS}=650V, V_{GS}=0V$	--	--	3	μA
Zero Gate Voltage Drain Current($T_C=125^\circ\text{C}$)	I_{DSS}	$V_{DS}=650V, V_{GS}=0V$	--	--	100	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	--	--	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	3	3.5	4	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=19A$	--	89	99	m Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=50V, V_{GS}=0V, F=1.0\text{MHz}$	--	2800	3200	pF
Output Capacitance	C_{oss}		--	97	--	pF
Reverse Transfer Capacitance	C_{rss}		--	1.5	--	pF
Total Gate Charge	Q_g	$V_{DS}=480V, I_D=38A, V_{GS}=10V$	--	45	55	nC
Gate-Source Charge	Q_{gs}		--	15	--	nC
Gate-Drain Charge	Q_{gd}		--	11.5	--	nC
Switching Times						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=380V, I_D=19A, R_G=1.7\Omega, V_{GS}=10V$	--	16	--	nS
Turn-on Rise Time	t_r		--	13	--	nS
Turn-Off Delay Time	$t_{d(off)}$		--	71	--	nS
Turn-Off Fall Time	t_f		--	13	--	nS
Source- Drain Diode Characteristics						
Source-drain Current(Body Diode)	I_{SD}	$T_C=25^\circ\text{C}$	--	--	38	A
Pulsed Source-drain Current(Body Diode)	I_{SDM}		--	--	152	A
Forward On Voltage	V_{SD}	$T_J=25^\circ\text{C}, I_{SD}=28A, V_{GS}=0V$	--	0.9	1.2	V
Reverse Recovery Time	t_{rr}	$T_J=25^\circ\text{C}, I_F=19A, di/dt=100A/\mu S$	--	180	--	nS
Reverse Recovery Charge	Q_{rr}		--	1.6	--	μC
Peak Reverse Recovery Current	I_{rrm}		--	18	--	A

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature

2. $T_J=25^\circ\text{C}, V_{DD}=50V, V_G=10V, R_G=25\Omega$

Typical Electrical and Thermal Characteristic Curves

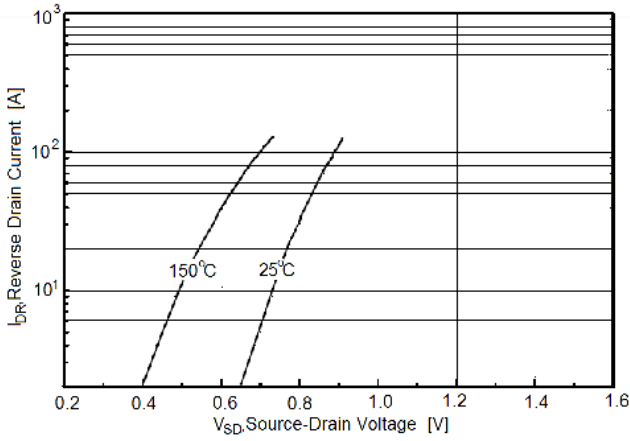


Figure 1. Source-Drain Diode Forward Voltage

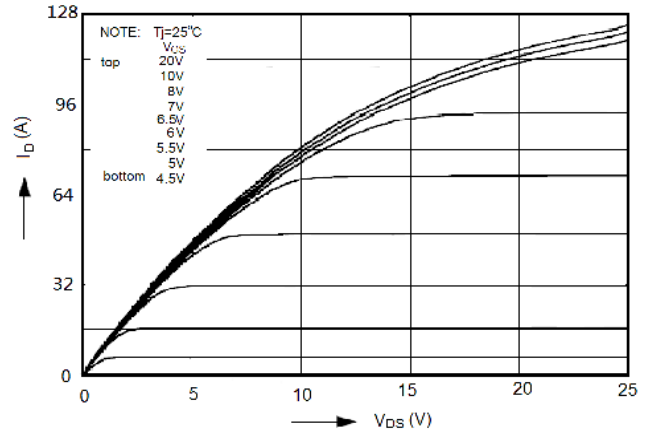


Figure 2. Output Characteristics

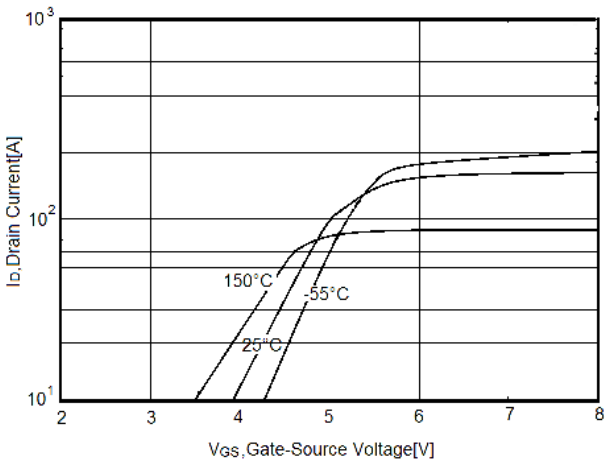


Figure 3. Transfer Characteristics

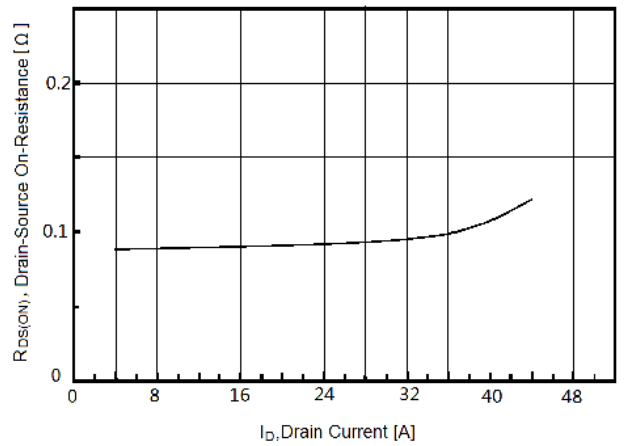


Figure 4. Static Drain-source on Resistance

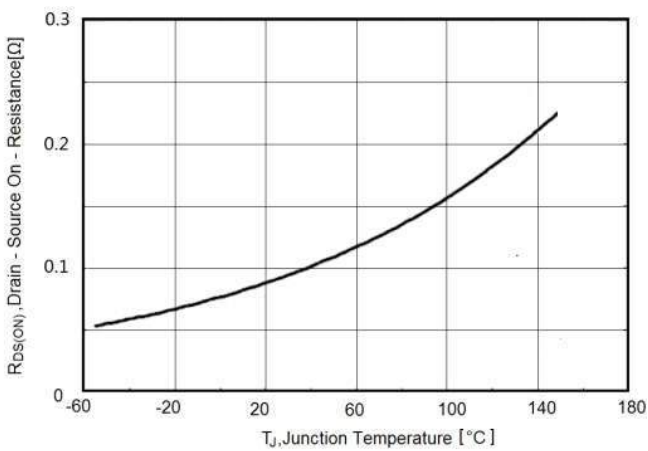


Figure 5. $R_{DS(ON)}$ vs Junction Temperature

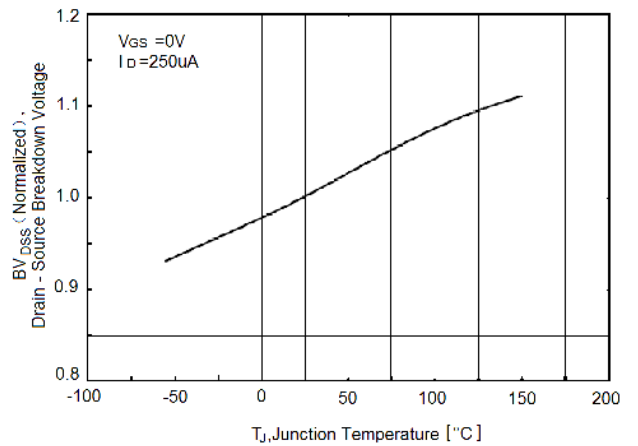


Figure 6. BV_{DSS} vs Junction Temperature

Typical Electrical and Thermal Characteristic Curves

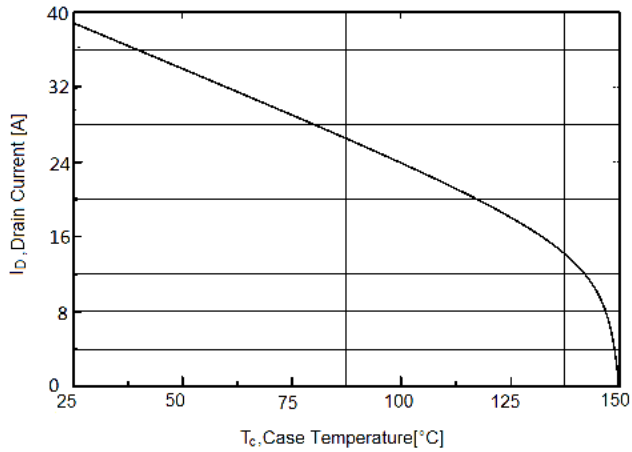


Figure 7. Maximum I_D vs Junction Temperature

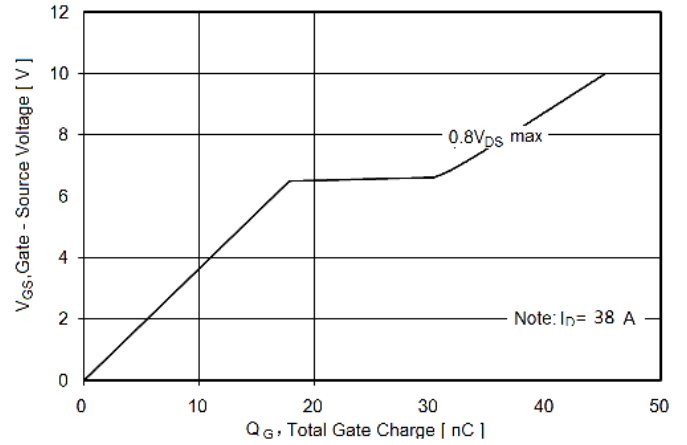


Figure 8. Gate Charge Waveforms

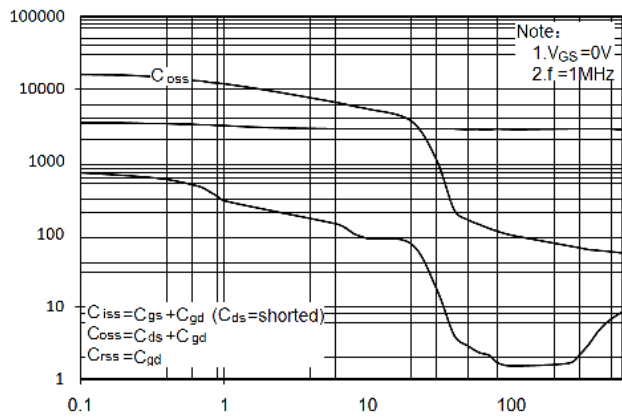


Figure 9. Capacitance

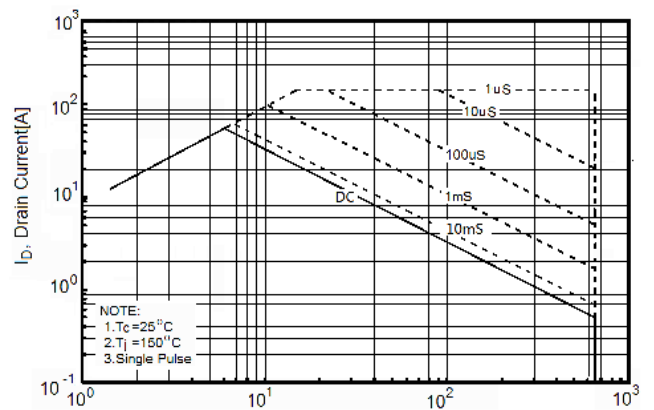


Figure 10. Safe Operating Area

Test Circuit & Waveform

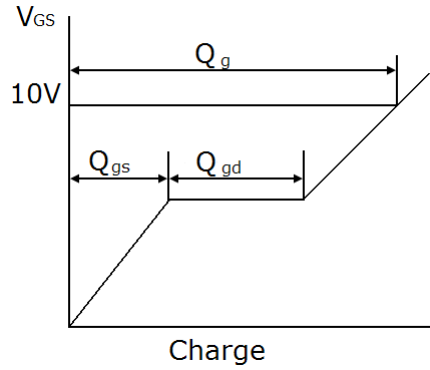
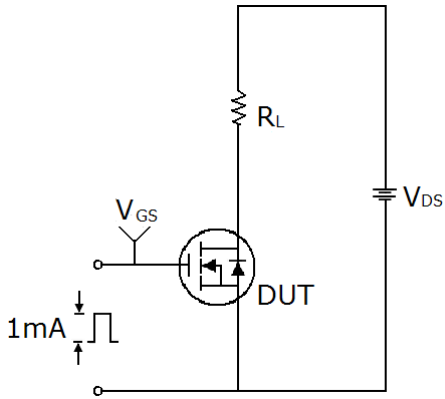


Figure 11. Gate Charge Test Circuit & Waveform

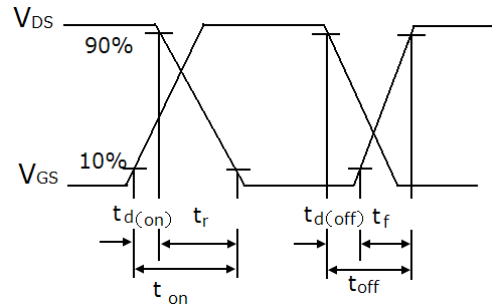
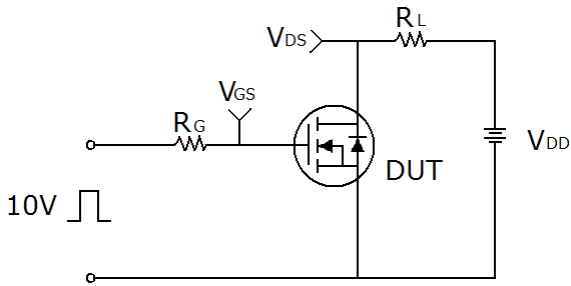


Figure 12. Switch Time Test Circuit & Waveform

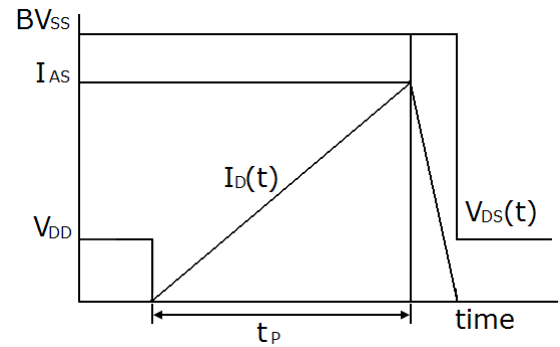
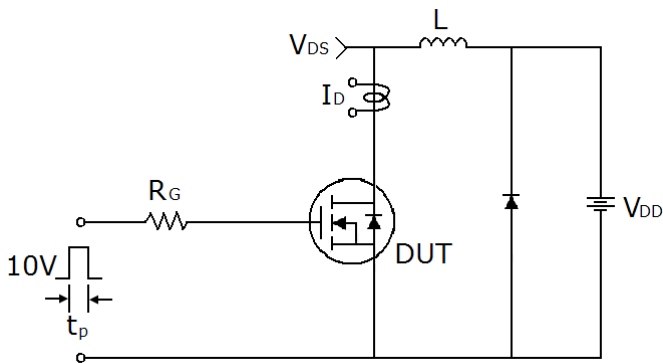
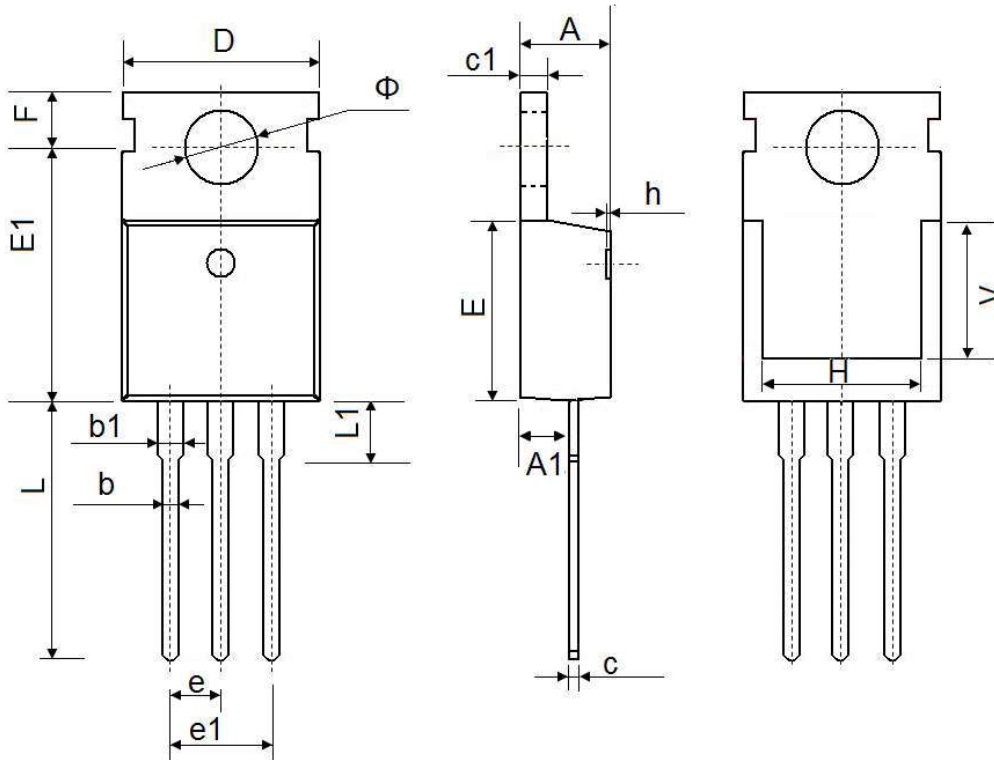


Figure 13. Unclamped Inductive Switching Test Circuit & Waveforms

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