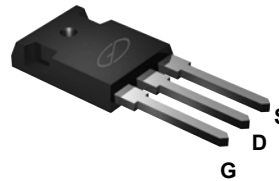
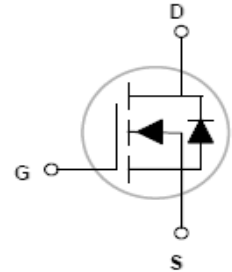


Main Product Characteristics

BV_{DSS}	650V
$R_{DS(ON)}$	109m Ω
I_D	38A



TO-247



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 GSFA6538 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($V_{GS}=0V$)	V_{DS}	650	V
Gate-Source Voltage($V_{DS}=0V$) AC ($f>1$ Hz)	V_{GS}	± 30	V
Drain Current-Continuous($T_C=25^\circ\text{C}$)	$I_{D(DC)}$	38	A
Drain Current-Continuous($T_C=100^\circ\text{C}$)		24	A
Drain Current-Pulsed ¹	I_{DM}	152	A
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
Power Dissipation($T_C=25^\circ\text{C}$)	P_D	322	W
Power Dissipation-Derate Above 25°C		2.58	W/ $^\circ\text{C}$
Drain Source Voltage Slope, $V_{DS} \leq 480$ V	dv/dt	50	V/ns
Reverse Diode dv/dt, $V_{DS} \leq 480$ V, $I_{SD} < I_D$		50	V/ns
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.39	$^\circ\text{C}/\text{W}$
Storage Temperature Range	T_{STG}	-55 To +150	$^\circ\text{C}$
Operating Junction Temperature Range	T_J	-55 To +150	$^\circ\text{C}$

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
On/Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=500\mu A$	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($T_C=125^{\circ}\text{C}$)		$V_{DS}=650V, V_{GS}=0V$	-	-	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	109	m Ω
Dynamic and Switching Characteristics						
Total Gate Charge	Q_g	$V_{DS}=480V, I_D=38A, V_{GS}=10V$	-	45	55	nC
Gate-Source Charge	Q_{gs}		-	15	-	
Gate-Drain Charge	Q_{gd}		-	11.5	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=380V, R_G=1.7\Omega, V_{GS}=10V, I_D=19A$	-	16	-	nS
Rise Time	t_r		-	13	-	
Turn-Off Delay Time	$t_{d(off)}$		-	71	-	
Fall Time	t_f		-	13	-	
Input Capacitance	C_{iss}	$V_{DS}=50V, V_{GS}=0V, F=1\text{MHz}$	-	2800	3200	pF
Output Capacitance	C_{oss}		-	97	-	
Reverse Transfer Capacitance	C_{rss}		-	1.5	-	
Drain-Source 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}	$V_{GS}=0V, I_{SD}=28A, T_J=25^{\circ}\text{C}$	-	0.9	1.2	V
Reverse Recovery Time	T_{rr}	$I_S=19A, di/dt=100A/\mu s, T_J=25^{\circ}\text{C}$	-	180	-	nS
Reverse Recovery Charge	Q_{rr}		-	1.6	-	nC
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

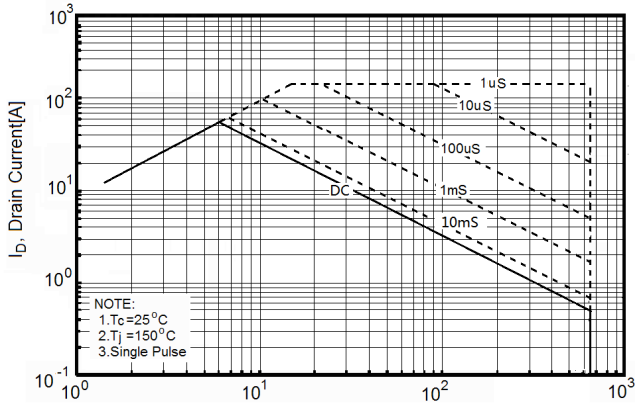


Figure 1. Safe Operating Area

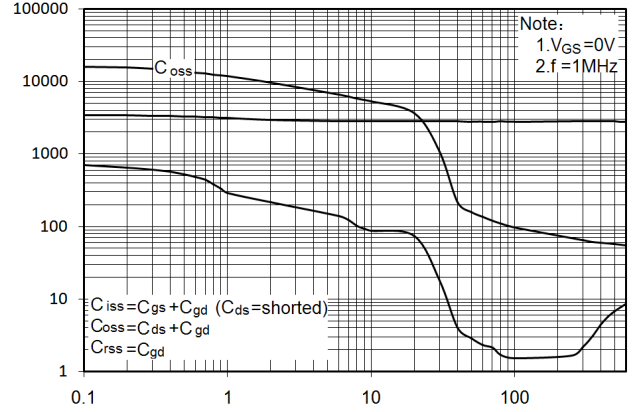


Figure 2. Capacitance

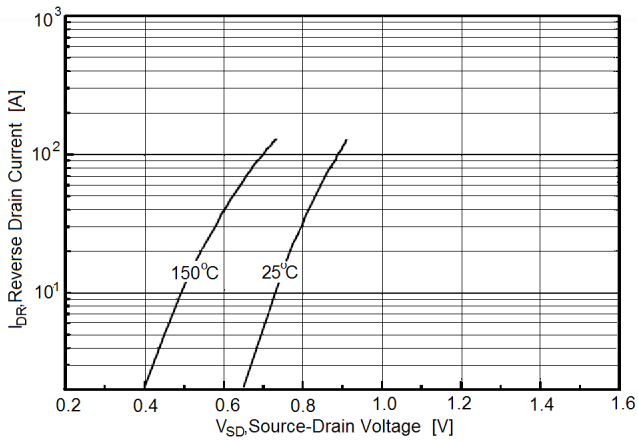


Figure 3. Source-Drain Diode Forward Voltage

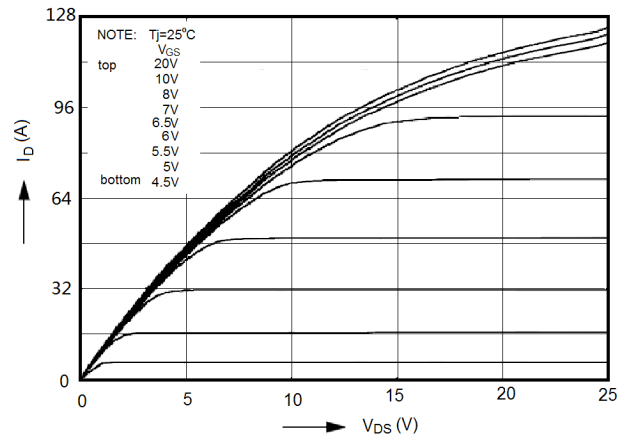


Figure 4. Output Characteristics

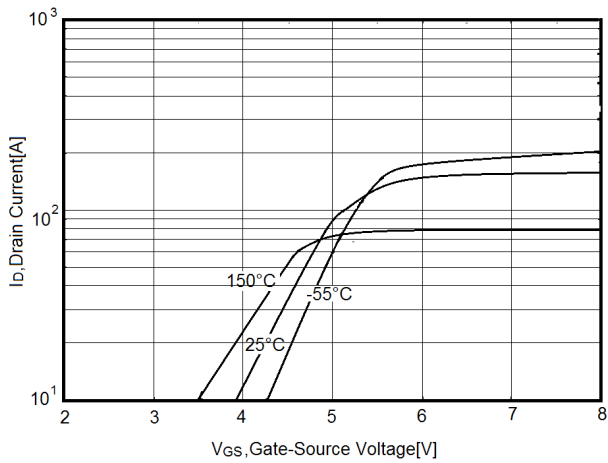


Figure 5. Transfer Characteristics

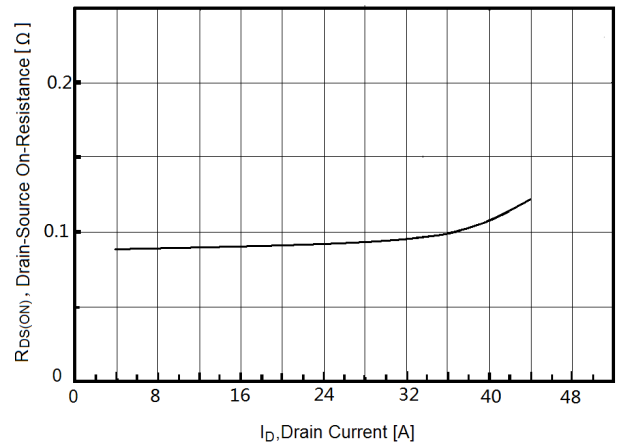


Figure 6. Static Drain-Source on Resistance

Typical Electrical and Thermal Characteristic Curves

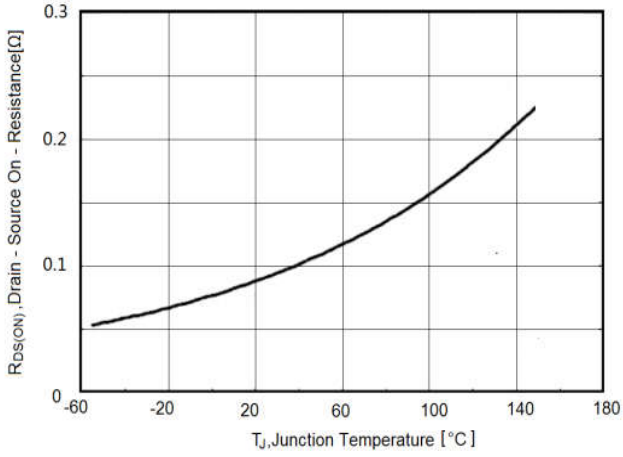


Figure7. R_{DS(ON)} vs Junction Temperature

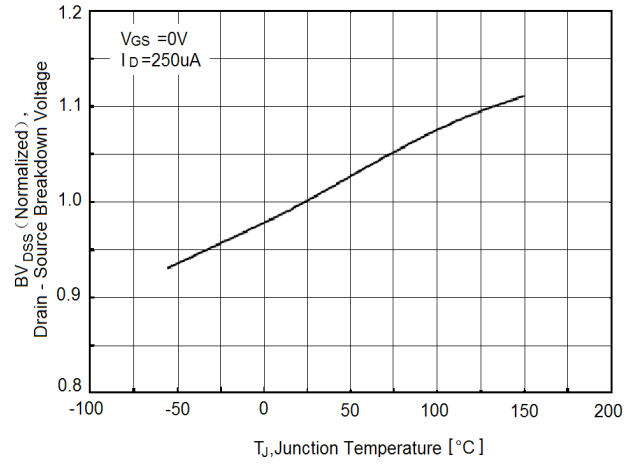


Figure8. BV_{DS} vs Junction Temperature

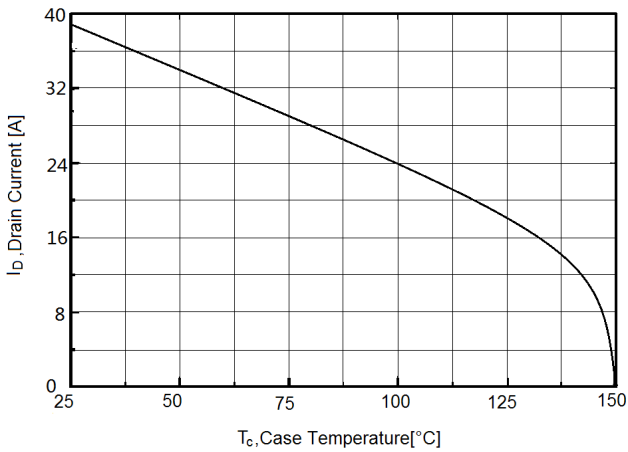


Figure 9. Maximum I_D vs Junction Temperature

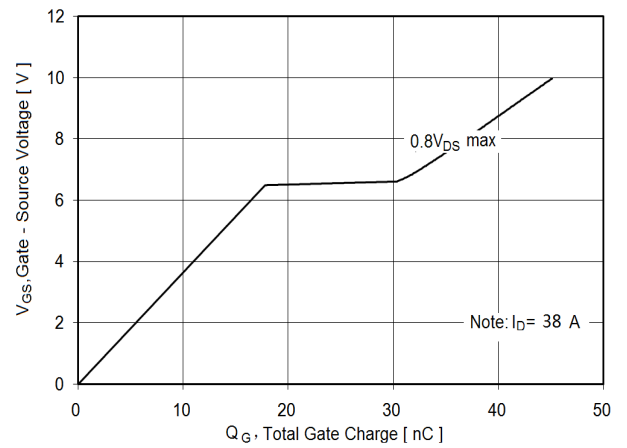


Figure10. Gate Charge Waveforms

Typical Electrical and Thermal Characteristic Curves

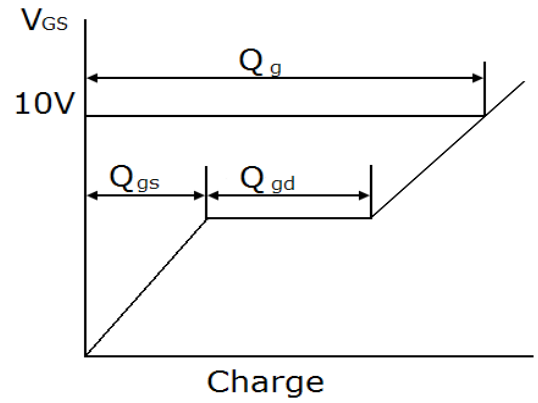
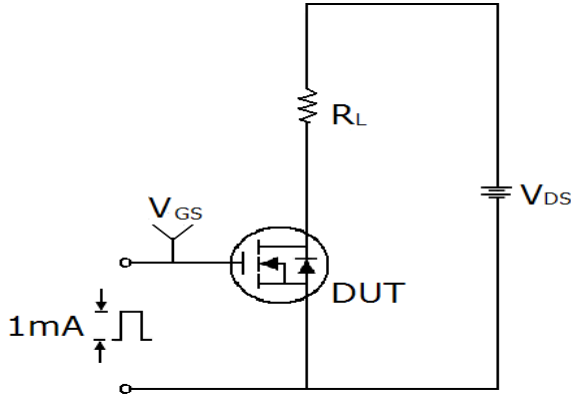


Figure 11. Gate Charge Test Circuit & Waveforms

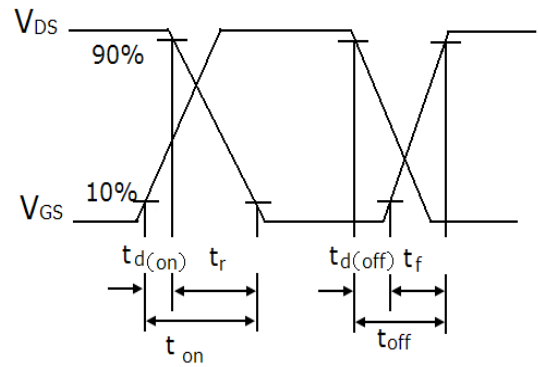
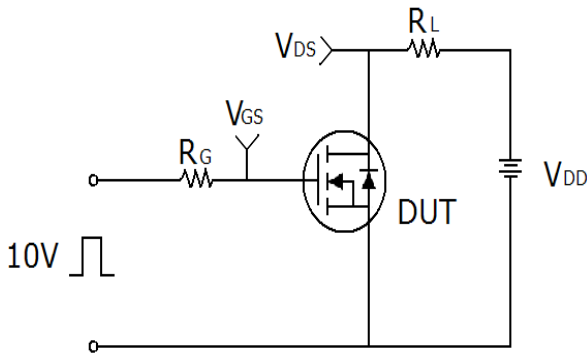


Figure 12. Switch Time Test Circuit

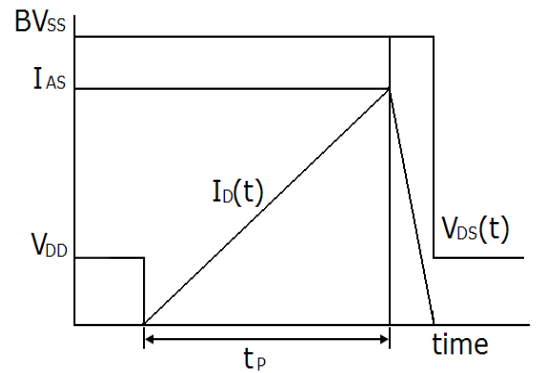
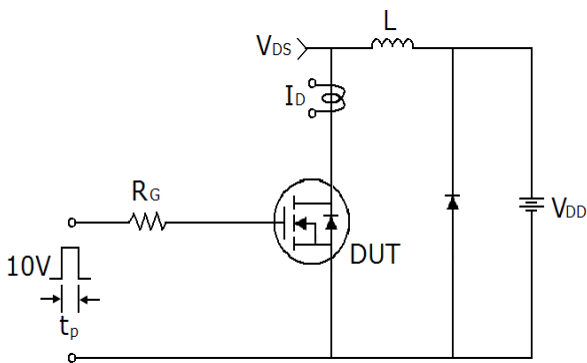
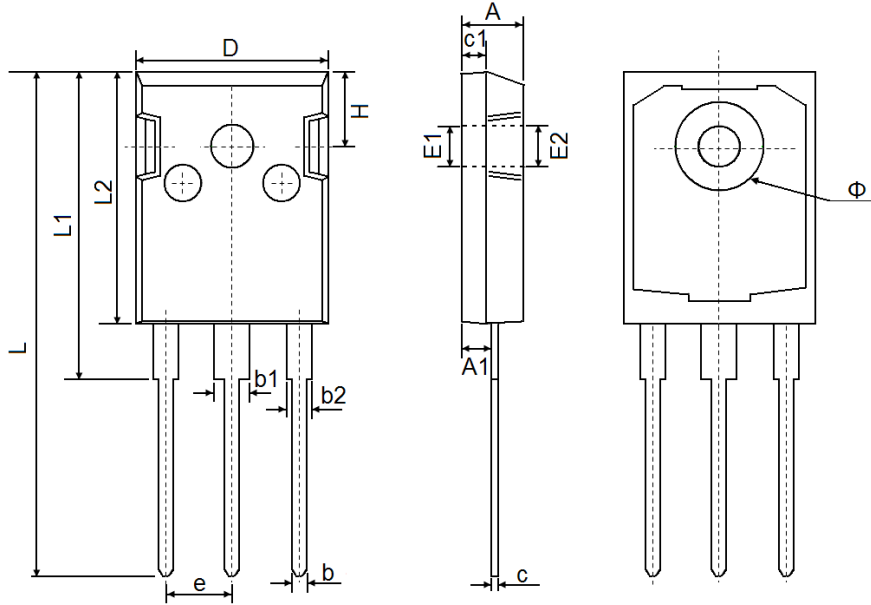


Figure 13. Unclamped Inductive Switching Test Circuit & Waveforms

Package Outline Dimensions (TO-247)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.850	5.150	0.191	0.200
A1	2.200	2.600	0.087	0.102
b	1.000	1.400	0.039	0.055
b1	2.800	3.200	0.110	0.126
b2	1.800	2.200	0.071	0.087
c	0.500	0.700	0.020	0.028
c1	1.900	2.100	0.075	0.083
D	15.450	15.750	0.608	0.620
E1	3.500 REF		0.138 REF	
E2	3.600 REF		0.142 REF	
L	40.900	41.300	1.610	1.626
L1	24.800	25.100	0.976	0.988
L2	20.300	20.600	0.799	0.811
Φ	7.100	7.300	0.280	0.287
e	5.450 TYP		0.215 TYP	
H	5.980 REF		0.235 REF	