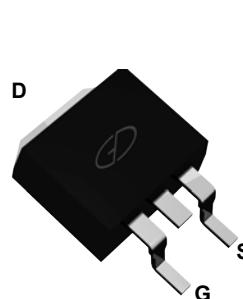
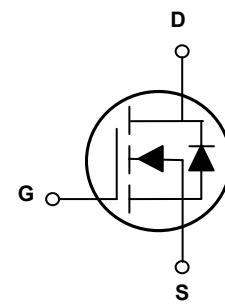


Main Product Characteristics

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


 TO-263 (D²PAK)


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 GSFT6538 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 supplies 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 ($V_{GS}=0\text{V}$)	V_{DS}	650	V
Gate-Source Voltage ($V_{DS}=0\text{V}$) 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	$I_{DM(\text{pulse})}$	152	A
Maximum Power Dissipation ($T_c=25^\circ\text{C}$)	P_D	322	W
Power Dissipation 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, $V_{DS}\leq 480\text{V}$,	dv/dt	50	V/nS
Reverse Diode dv/dt , $V_{DS}\leq 480\text{V}$, $I_{SD}<I_D$	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	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient (Maximum)	$R_{\theta JA}$	62	$^\circ\text{C}/\text{W}$

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
On / Off States						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{\text{GS}}=0\text{V}, I_{\text{D}}=500\mu\text{A}$	650	--	--	V
Zero Gate Voltage Drain Current, $T_C=25^\circ\text{C}$	I_{DSS}	$V_{\text{DS}}=650\text{V}, V_{\text{GS}}=0\text{V}$	--	--	3	μA
Zero Gate Voltage Drain Current $T_C=125^\circ\text{C}$	I_{DSS}	$V_{\text{DS}}=650\text{V}, V_{\text{GS}}=0\text{V}$	--	--	100	μA
Gate-Body Leakage Current	I_{GSS}	$V_{\text{GS}}=\pm 20\text{V}, V_{\text{DS}}=0\text{V}$	--	--	± 100	nA
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}}=V_{\text{GS}}, I_{\text{D}}=250\mu\text{A}$	3	3.5	4	V
Drain-Source On-State Resistance	$R_{\text{DS}(\text{ON})}$	$V_{\text{GS}}=10\text{V}, I_{\text{D}}=19\text{A}$	--	89	109	$\text{m}\Omega$
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{\text{DS}}=50\text{V}, V_{\text{GS}}=0\text{V}, F=1.0\text{MHz}$	--	2800	3200	pF
Output Capacitance	C_{oss}		--	97	--	pF
Reverse Transfer Capacitance	C_{rss}		--	1.5	--	pF
Total Gate Charge	Q_g	$V_{\text{DS}}=480\text{V}, I_{\text{D}}=38\text{A}, V_{\text{GS}}=10\text{V}$	--	45	55	nC
Gate-Source Charge	Q_{gs}		--	15	--	nC
Gate-Drain Charge	Q_{gd}		--	11.5	--	nC
Switching Times						
Turn-on Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{DD}}=380\text{V}, I_{\text{D}}=19\text{A}, R_{\text{G}}=1.7\Omega, V_{\text{GS}}=10\text{V}$	--	16	--	nS
Turn-on Rise Time	t_r		--	13	--	nS
Turn-Off Delay Time	$t_{\text{d}(\text{off})}$		--	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}	$T_J=25^\circ\text{C}, I_{\text{SD}}=28\text{A}, V_{\text{GS}}=0\text{V}$	--	0.9	1.2	V
Reverse Recovery Time	t_{rr}	$T_J=25^\circ\text{C}, I_F=19\text{A}, \text{di/dt}=100\text{A}/\mu\text{s}$	--	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. $T_J=25^\circ\text{C}, V_{\text{DD}}=50\text{V}, V_{\text{G}}=10\text{V}, R_{\text{G}}=25\Omega$

Typical Electrical and Thermal Characteristic Curves

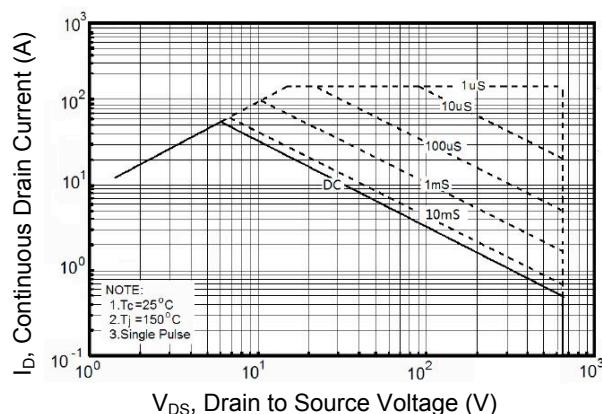


Figure 1. Safe Operating Area

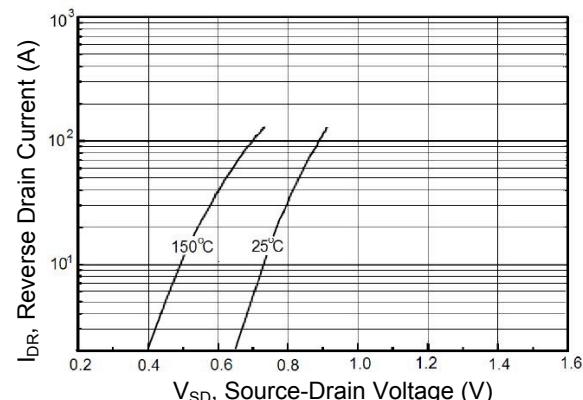


Figure 2. Source-Drain Diode Forward Voltage

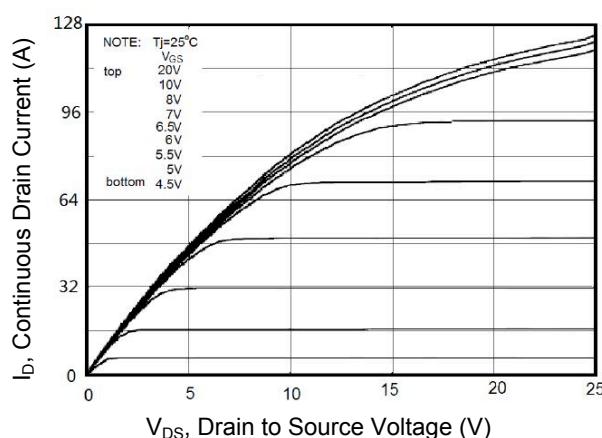


Figure 3. Output Characteristics

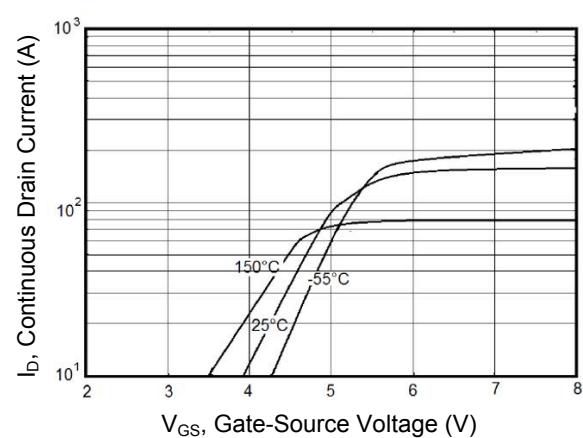


Figure 4. Transfer Characteristics

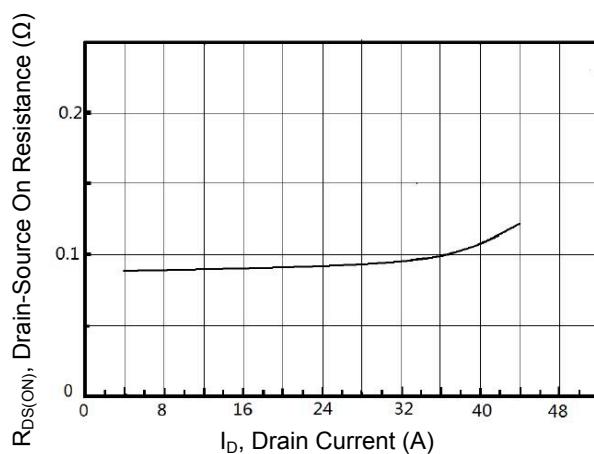


Figure 5. Static Drain-Source On Resistance

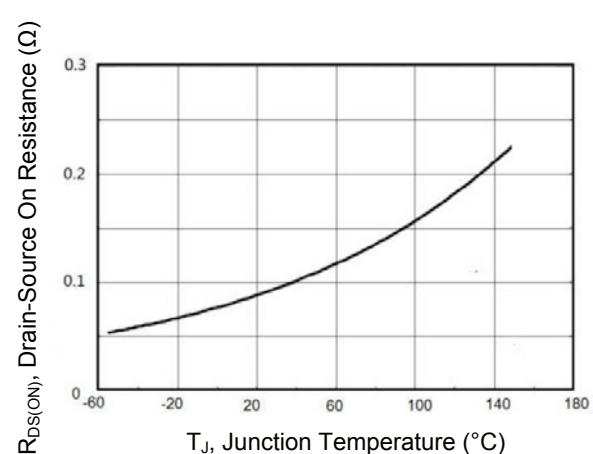


Figure 6. Normalized $R_{DS(ON)}$ vs. T_J

Typical Electrical and Thermal Characteristic Curves

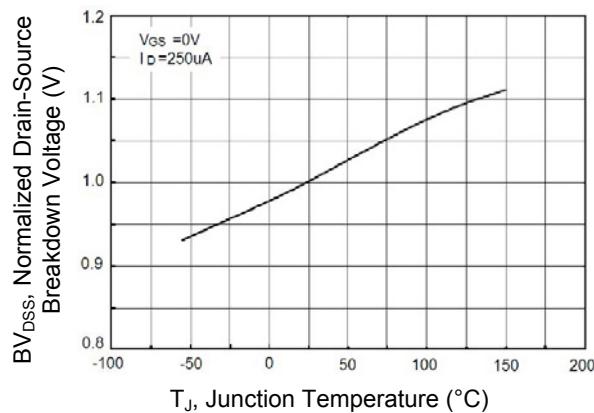


Figure 7. BV_{DSS} vs Junction Temperature

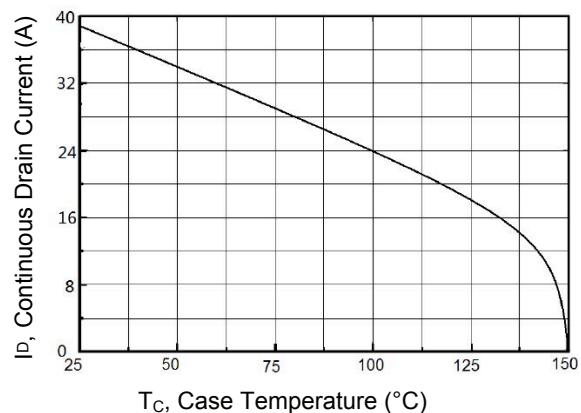


Figure 8. Maximum I_D vs. Junction Temperature

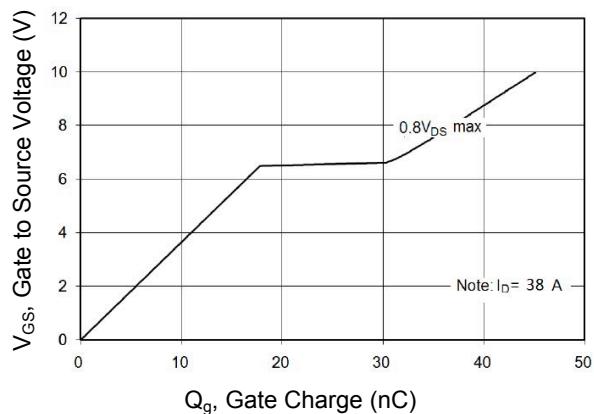


Figure 9. Gate Charge Characteristics

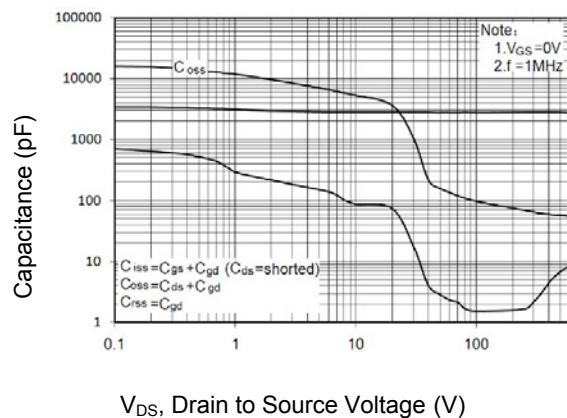
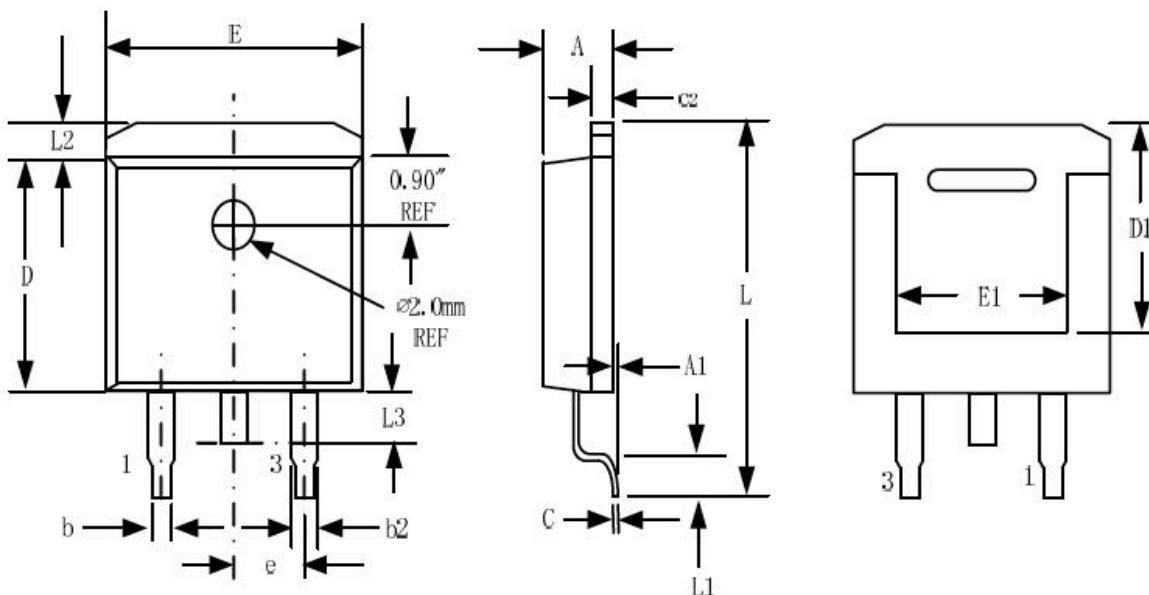


Figure 10. Capacitance Characteristics

Package Outline Dimensions (TO-263/D²PAK)



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	4.320	4.570	0.170	0.180
A1	-	0.250	-	0.010
b	0.710	0.940	0.028	0.037
b2	1.150	1.400	0.045	0.055
c	0.460	0.610	0.018	0.024
c2	1.220	1.400	0.048	0.055
D	8.890	9.400	0.350	0.370
D	8.010	8.230	0.315	0.324
E	10.040	10.280	0.395	0.405
E1	7.880	8.080	0.310	0.318
e	2.540 BSC		0.100 BSC	
L	14.730	15.750	0.580	0.620
L1	2.290	2.790	0.090	0.110
L2	1.150	1.390	0.045	0.055
L3	1.270	1.770	0.050	0.070