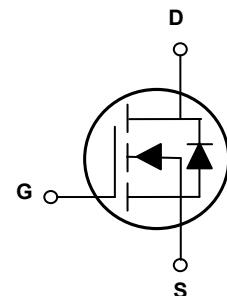


Main Product Characteristics

$V_{(BR)DSS}$	650V
$R_{DS(ON)}$	0.038Ω (Max.)
I_D	80A



TO-247

Schematic Diagram

Features and Benefits

- Advanced MOSFET process technology
- Low drain-to-source on-resistance
- Fast switching and reverse body recovery



Description

The GSFA6580 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 ($T_J=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	± 30	V
Drain Current-Continuous ¹ ($T_C=25^\circ\text{C}$)	I_D	80	A
Drain Current-Continuous ¹ ($T_C=100^\circ\text{C}$)		50	
Drain Current-Pulsed ² ($T_C=25^\circ\text{C}$)	$I_{D,pulse}$	240	A
Continuous Diode Forward Current ¹ ($T_C=25^\circ\text{C}$)	I_S	80	A
Diode Pulsed Current ² ($T_C=25^\circ\text{C}$)	$I_{S,pulse}$	240	A
Power Dissipation ³ ($T_C=25^\circ\text{C}$)	P_D	500	W
Single Pulsed Avalanche Energy ⁵	E_{AS}	2900	mJ
MOSFET dv/dt Ruggedness, $V_{DS}=0-480\text{V}$	dv/dt	100	V/ns
Reverse Diode dv/dt, $V_{DS}=0-480\text{V}$, $I_{SD} \leq I_D$	dv/dt	50	V/ns
Thermal Resistance, Junction-to-Ambient ⁴	$R_{\theta JA}$	62	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.25	°C/W
Junction Temperature Range	T_J	-55 To +150	°C
Storage Temperature Range	T_{STG}	-55 To +150	°C

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
On / Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{\text{GS}}=0\text{V}, I_{\text{D}}=2\text{mA}$	650	-	-	V
		$V_{\text{GS}}=0\text{V}, I_{\text{D}}=2\text{mA}$ $T_J=150^\circ\text{C}$	700	770	-	
Drain-Source Leakage Current	I_{DSS}	$V_{\text{DS}}=650\text{V}, V_{\text{GS}}=0\text{V}$	-	-	10	μA
Gate-Source Leakage Current	I_{GSS}	$V_{\text{GS}}=\pm 30\text{V}$	-	-	± 100	nA
Static Drain-Source On-Resistance	$R_{\text{DS}(\text{ON})}$	$V_{\text{GS}}=10\text{V}, I_{\text{D}}=40\text{A}$	-	0.032	0.038	Ω
		$V_{\text{GS}}=10\text{V}, I_{\text{D}}=40\text{A},$ $T_J=150^\circ\text{C}$	-	0.083	-	
Gate Resistance	R_{G}	F=1MHz, Open Drain	-	2.1	-	Ω
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{GS}}=V_{\text{DS}}, I_{\text{D}}=2\text{mA}$	3.0	-	4.5	V
Dynamic and Switching Characteristics						
Total Gate Charge	Q_{g}	$V_{\text{DS}}=400\text{V}, I_{\text{D}}=40\text{A},$ $V_{\text{GS}}=10\text{V}$	-	175.0	-	nC
Gate-Source Charge	Q_{gs}		-	40.1	-	
Gate-to-Drain Charge	Q_{gd}		-	76.1	-	
Gate Plateau Voltage	V_{plateau}		-	6.4	-	
Turn-On Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{DS}}=400\text{V}, R_{\text{G}}=2\Omega,$ $V_{\text{GS}}=10\text{V}, I_{\text{D}}=40\text{A}$	-	55.9	-	nS
Rise Time	t_{r}		-	121.2	-	
Turn-Off Delay Time	$t_{\text{d}(\text{off})}$		-	114.2	-	
Fall Time	t_{f}		-	8.75	-	
Input Capacitance	C_{iss}	$V_{\text{DS}}=50\text{V}, V_{\text{GS}}=0\text{V},$ $F=100\text{kHz}$	-	9276	-	pF
Output Capacitance	C_{oss}		-	486	-	
Reverse Transfer Capacitance	C_{rss}		-	12.8	-	
Effective Output Capacitance, Energy Related	$C_{\text{o(er)}}$	$V_{\text{GS}}=0\text{V},$ $V_{\text{DS}}=0\text{V}-400\text{V}$	-	278	-	
Effective Output Capacitance, Time Related	$C_{\text{o(tr)}}$		-	1477	-	
Drain-Source Diode Characteristics and Maximum Ratings						
Peak Reverse Recovery Current	I_{rrm}	$I_{\text{s}}=30\text{A},$ $\text{di}/\text{dt}=100\text{A}/\mu\text{s}$	-	15.2	-	A
Reverse Recovery Time	T_{rr}		-	180	-	ns
Reverse Recovery Charge	Q_{rr}		-	1.5	-	uC
Diode Forward Voltage	V_{SD}	$V_{\text{GS}}=0\text{V}, I_{\text{s}}=80\text{A}$	-	-	1.3	V

Note:

- Calculated continuous current based on maximum allowable junction temperature.
- Repetitive rating; pulse width limited by max. junction temperature.
- P_{d} is based on max. junction temperature, using junction-case thermal resistance.
- The value of R_{\thetaJA} is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$.
- $V_{\text{DD}}=300\text{V}, V_{\text{GS}}=10\text{V}, L=40\text{mH}$, starting $T_J=25^\circ\text{C}$.

Typical Electrical and Thermal Characteristic Curves

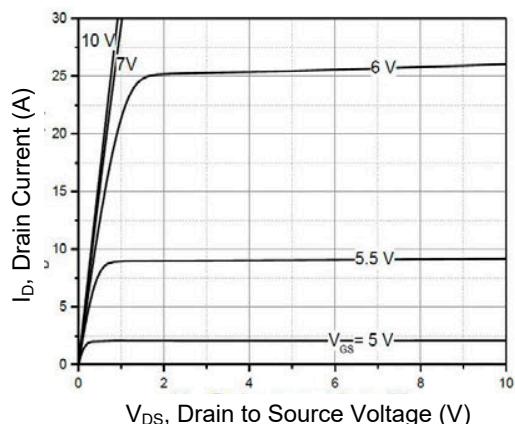


Figure 1. Output Characteristics

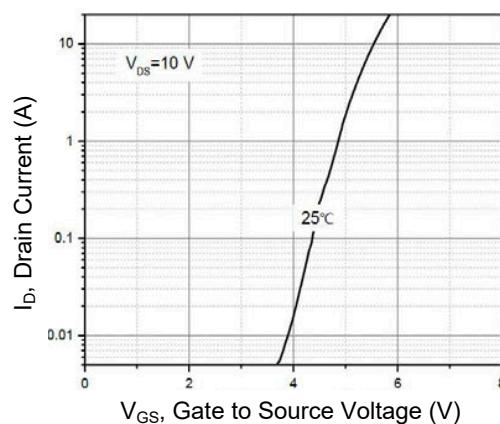


Figure 2. Transfer Characteristics

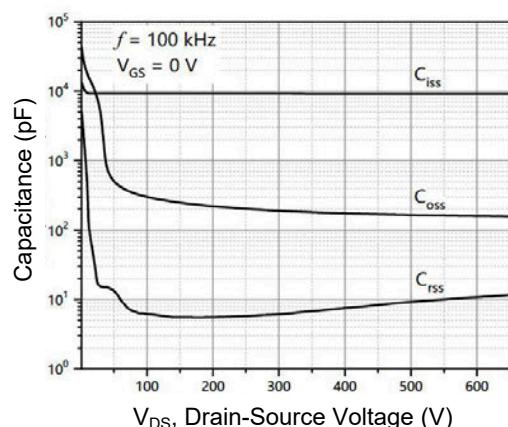


Figure 3. Capacitance Characteristics

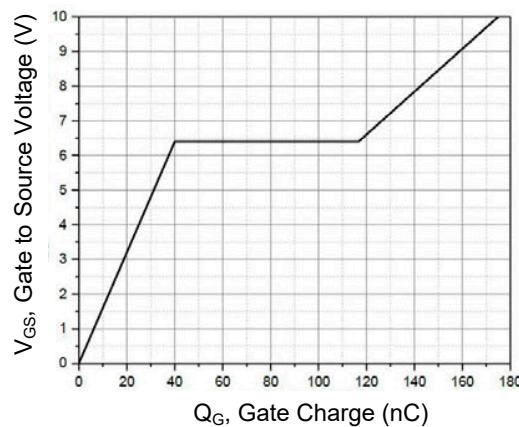


Figure 4. Gate Charge

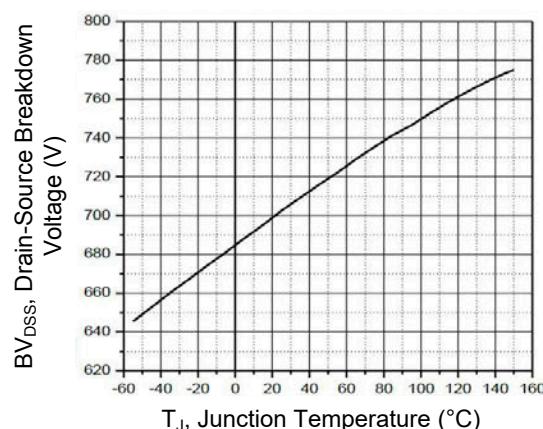


Figure 5. Drain-Source Breakdown Voltage

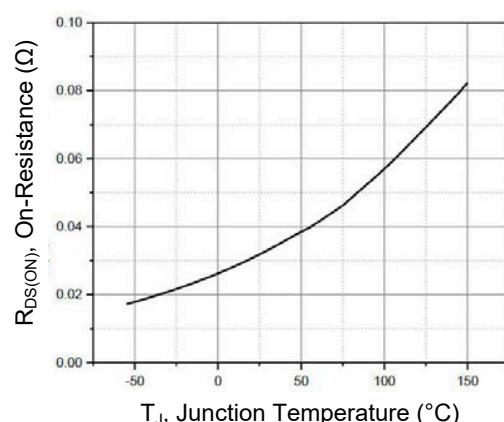


Figure 6. Drain-Source On-State Resistance

Typical Electrical and Thermal Characteristic Curves

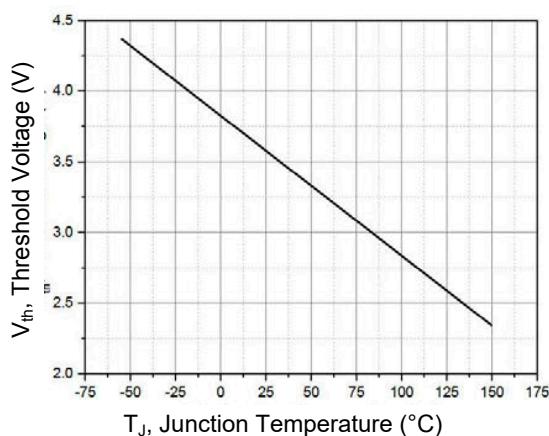


Figure 7. Threshold Voltage

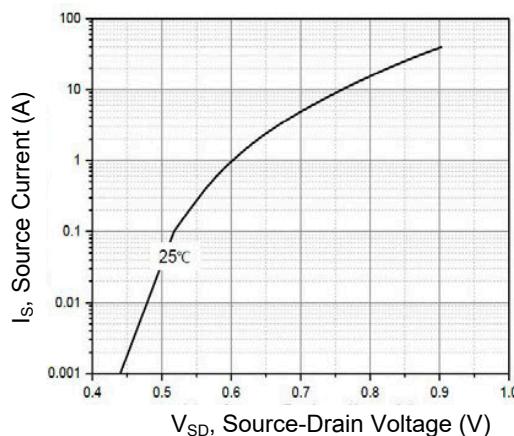


Figure 8. Forward Characteristics of Body Diode

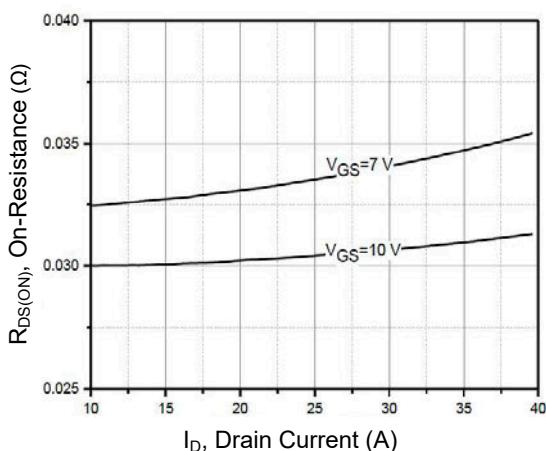


Figure 9. $R_{DS(on)}$ vs. Drain Current

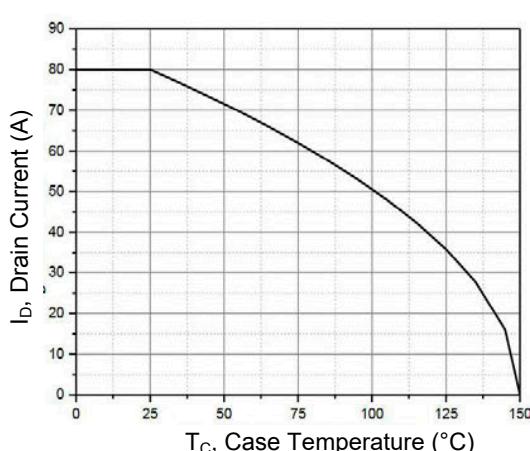


Figure 10. Drain Current

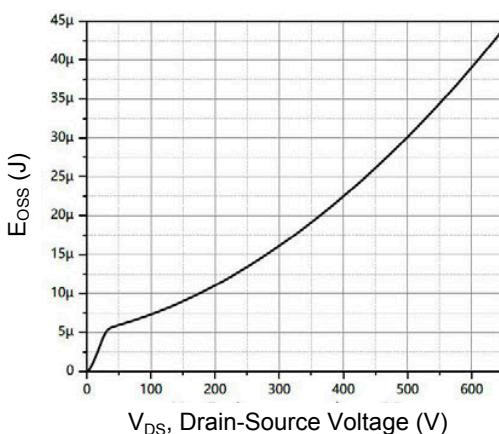


Figure 11. Typ. Coss Stored Energy

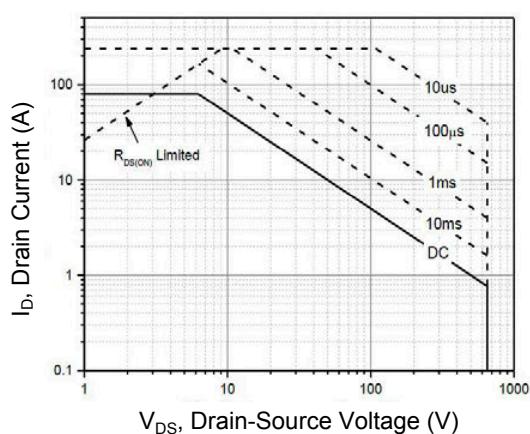
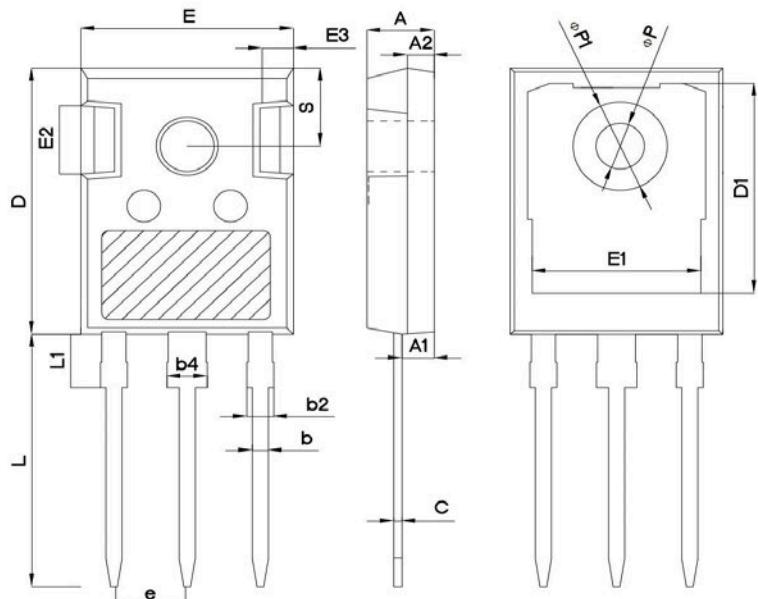


Figure 12. Safe Operation Area, $T_c=25^\circ\text{C}$

Package Outline Dimensions (TO-247)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.800	5.200	0.189	0.205
A1	2.210	2.590	0.087	0.102
A2	1.850	2.150	0.073	0.085
b	1.110	1.360	0.044	0.054
b2	1.910	2.210	0.075	0.087
b4	2.910	3.210	0.115	0.126
c	0.510	0.750	0.020	0.030
D	20.800	21.300	0.819	0.839
D1	16.250	16.850	0.640	0.663
E	15.500	16.100	0.610	0.634
E1	13.000	13.600	0.512	0.535
E2	4.800	5.200	0.189	0.205
E3	2.300	2.700	0.091	0.106
e	5.440 BSC		0.214 BSC	
L	19.820	20.220	0.780	0.796
L1	-	4.300	-	0.169
θP	3.400	3.800	0.134	0.150
θP1	-	7.300	-	0.287
S	6.150 BSC		0.242 BSC	