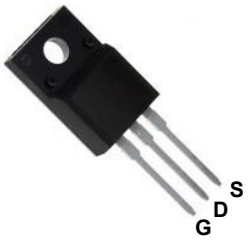
GOOD-ARK SEMICONDUCTOR

GSFU65R400

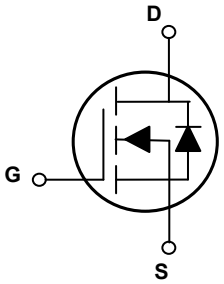
650V N-Channel MOSFET

Main Product Characteristics

$V_{(BR)DSS}$	650V
$R_{DS(ON)}$	0.40Ω (max.)
I_D	11A



TO-220F



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 GSFU65R400 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_A=25°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, at Steady-State, (T_C=25°C)	I_D	11	A
Drain Current-Continuous, at Steady-State, (T_C=100°C)		7	
Drain Current-Pulsed	I_{DM}	44	A
Single Pulse Avalanche Energy[1]	E_{AS}	356	mJ
Single Pulse Avalanche Current	I_{AS}	2.8	A
Power Dissipation (T_C=25°C)	P_D	31	W
		0.24	W/°C
Body Diode Reverse Voltage Slope[2]	dv/dt	15	V/ns
MOS dv/dt Ruggedness[3]	dv/dt	100	V/ns
Junction-to-Ambient (PCB Mounted, Steady-State)	$R_{\theta JA}$	62.5	°C/W
Junction-to-Case	$R_{\theta JC}$	4.1	°C/W
Operating Junction Temperature Range	T_J	-55 To +150	°C
Storage Temperature Range	T_{STG}	-55 To +150	°C
Soldering Temperature	T_{Sold}	260	°C

Electrical Characteristics (T_J=25°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=250uA	650	-	-	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=650V, V_{GS}=0V T_J=25°C	-	-	1	μA
		V_{DS}=650V, V_{GS}=0V T_J=125°C	-	1.5	-	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±30V, V_{DS}=0V	-	-	±100	nA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=5.5A	-	0.33	0.40	Ω
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=250uA	2.0	-	4.0	V
Gate Resistance	R_g	F=1MHz	-	3.6	-	Ω
Dynamic and Switching Characteristics						
Total Gate Charge[4,5]	Q_g	V_{DD}=520V, I_D=11A, V_{GS}=10V	-	30	-	nC
Gate-Source Charge[4,5]	Q_{gs}		-	7.8	-	
Gate-Drain ("Miller") Charge[4,5]	Q_{gd}		-	15	-	
Gate Plateau[4,5]	$V_{plateau}$		-	6.9	-	V
Turn-On Delay Time[4,5]	$t_{d(on)}$	V_{DD}=325V, R_G=24Ω, V_{GS}=10V, I_D=11A	-	15	-	nS
Rise Time[4,5]	t_r		-	35	-	
Turn-Off Delay Time[4,5]	$t_{d(off)}$		-	65	-	
Fall Time[4,5]	t_f		-	30	-	
Input Capacitance	C_{lss}	V_{DS}=100V, V_{GS}=0V, F=1MHz	-	925	-	pF
Output Capacitance	C_{oss}		-	30	-	
Reverse Transfer Capacitance	C_{rss}		-	0.8	-	
Drain-Source Diode Characteristics and Maximum Ratings						
Continuous Source Current (Body Diode)	I_S	T_C=25°C, MOSFET symbol showing the integral reverse p-n junction diode.	-	-	11	A
Diode Pulse Current	$I_{S.pulse}$		-	-	44	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=11A	-	-	1.4	V
Reverse Recovery Time[4]	t_{rr}	V_{GS}=0V, I_S=11A, dI_F/dt=100A/μs	-	254	-	nS
Reverse Recovery Charge[4]	Q_{rr}		-	3.2	-	uC
Reverse Recovery Peak Current[4]	I_{rrm}		-	25	-	A

Note:

1. L=79mH, V_{DD}=100V, R_G=25Ω, starting temperature T_J=25°C.
2. V_{DS}=0-400V, I_{SD} ≤ I_S, T_J=25°C.
3. V_{DS}=0-480V.
4. Pulse test: pulse width ≤ 300us, duty cycle ≤ 2%.
5. Essentially independent of operating temperature.

Typical Electrical and Thermal Characteristic Curves

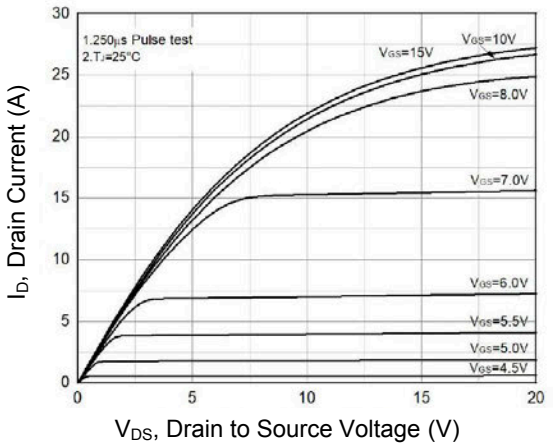


Figure 1. Typical Output Characteristics

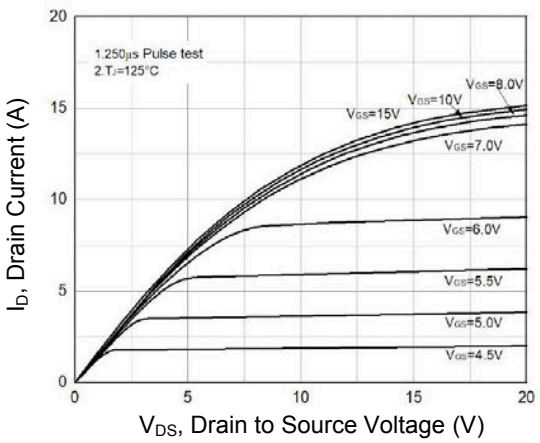


Figure 2. Typical Output Characteristics

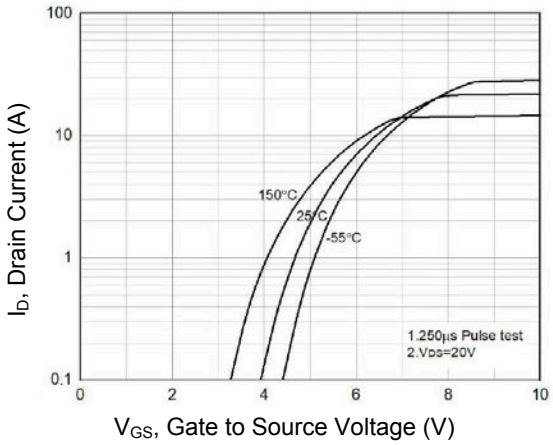


Figure 3. Transfer Characteristics

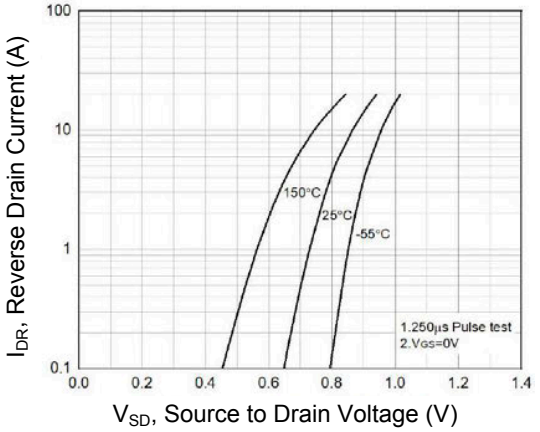


Figure 4. Body Diode Characteristics

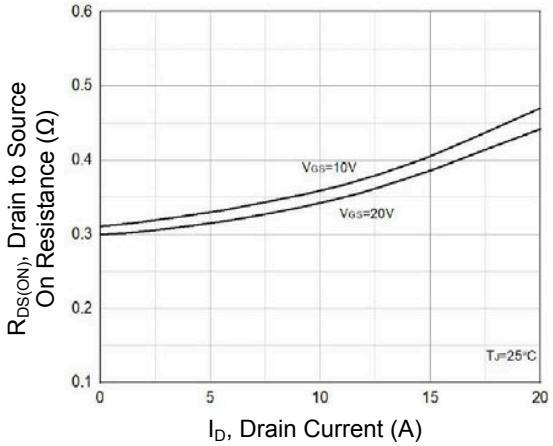


Figure 5. $R_{DS(ON)}$ vs. Drain Current

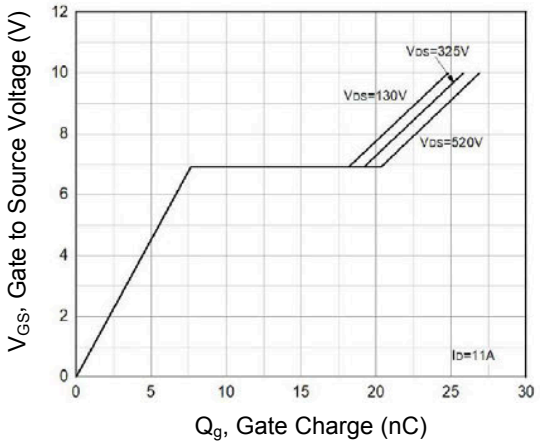


Figure 6. Gate Charge Characteristics

Typical Electrical and Thermal Characteristic Curves

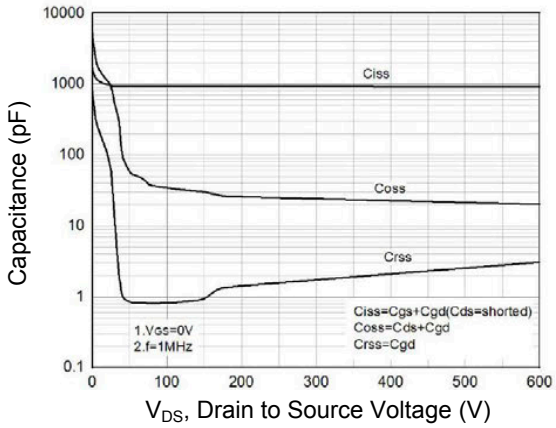


Figure 7. Capacitance Characteristics

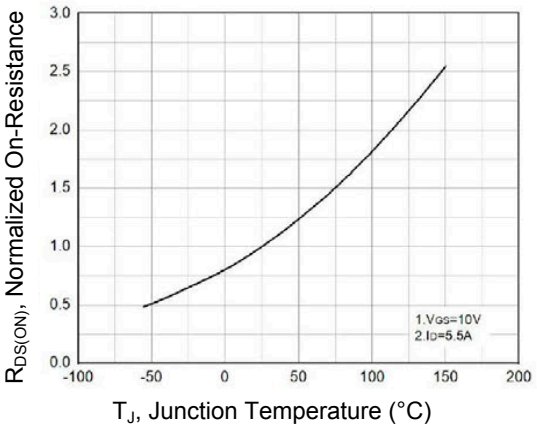


Figure 8. Normalized $R_{DS(ON)}$ vs. T_J

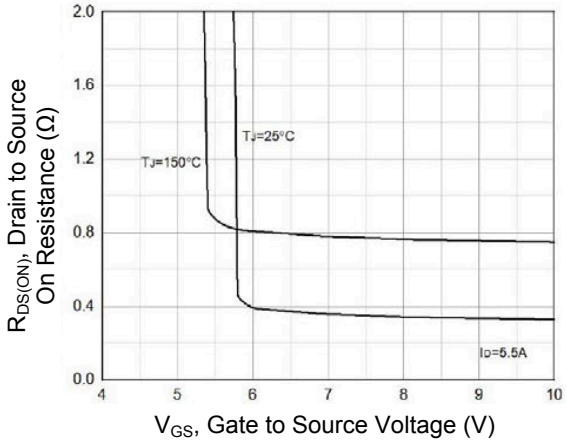


Figure 9. $R_{DS(ON)}$ vs. V_{GS}

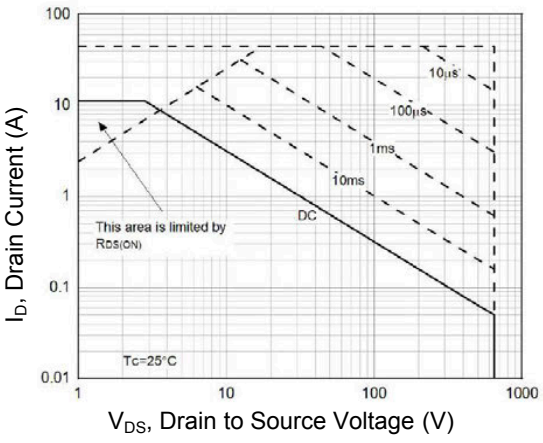


Figure 10. Safe Operation Area

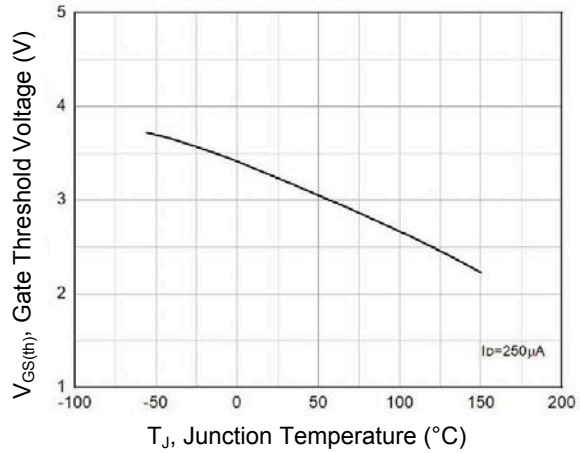


Figure 11. Gate Threshold Voltage vs. T_J

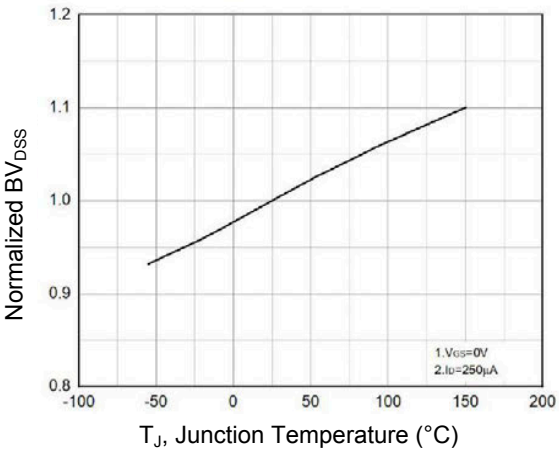
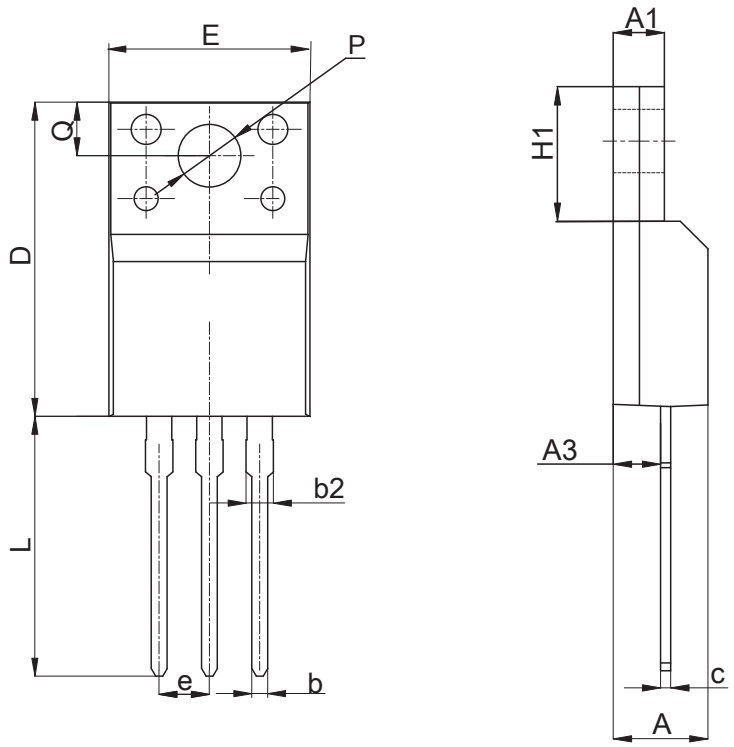


Figure 12. Normalized BV_{DSS} vs. T_J

Package Outline Dimensions (TO-220F)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.42	5.02	0.174	0.198
A1	2.30	2.83	0.091	0.111
A3	2.15	3.10	0.085	0.122
b	0.55	0.85	0.022	0.033
b2	0.96	1.46	0.038	0.057
c	0.35	0.65	0.014	0.026
D	15.25	16.25	0.600	0.640
E	9.73	10.50	0.383	0.413
e	2.50	2.60	0.098	0.102
H1	6.40	6.70	0.252	0.264
L	12.48	13.70	0.491	0.539
P	3.00	3.60	0.118	0.142
Q	3.05	3.60	0.120	0.142

Order Information

Device	Package	Marking	Carrier	Quantity
GSFU65R400	TO-220F	U65R400	Tube	50 pcs / Tube