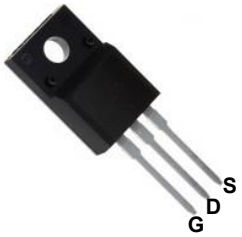
GOOD-ARK SEMICONDUCTOR

GSFU9504

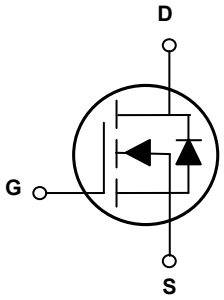
950V N-Channel MOSFET

Main Product Characteristics

$V_{(BR)DSS}$	950V
$R_{DS(ON)}$	1.2Ω (Max.)
I_D	5A



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 GSFU9504 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°C unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	V_{DSS}	950	V
Gate-Source Voltage	V_{GS}	±30	V
Drain Current-Continuous[1] (T_C=25°C)	I_D	5	A
Drain Current-Continuous[1] (T_C=100°C)		3.2	
Drain Current-Pulsed[2] (T_C=25°C)	$I_{D.pulse}$	15	A
Continuous Diode Forward Current[1] (T_C=25°C)	I_S	5	A
Diode Pulsed Current[2] (T_C=25°C)	$I_{S.pulse}$	15	A
Power Dissipation[3] (T_C=25°C)	P_D	31	W
Single Pulsed Avalanche Energy[4]	E_{AS}	160	mJ
MOSFET dv/dt Ruggedness, V_{DS}=0-480V	dv/dt	50	V/ns
Reverse Diode dv/dt, V_{DS}=0-480V, I_{SD}≤I_D	dv/dt	15	V/ns
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	4	°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°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	950	-	-	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=950V, V_{GS}=0V	-	-	10	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±30V	-	-	±100	nA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=2A	-	0.92	1.2	Ω
		V_{GS}=10V, I_D=2A, T_J=150°C	-	2.82	-	
Gate Resistance	R_G	F=1MHz, Open Drain	-	29.5	-	Ω
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=250uA	2.9	-	3.9	V
Dynamic and Switching Characteristics						
Total Gate Charge	Q_g	V_{DS}=400V, I_D=2.5A, V_{GS}=10V	-	14.9	-	nC
Gate-Source Charge	Q_{gs}		-	4.8	-	
Gate-to-Drain Charge	Q_{gd}		-	3.4	-	
Gate Plateau Voltage	$V_{plateau}$		-	5	-	V
Turn-On Delay Time	$t_{d(on)}$	V_{DS}=400V, R_G=2Ω, V_{GS}=10V, I_D=2.5A	-	30	-	nS
Rise Time	t_r		-	14	-	
Turn-Off Delay Time	$t_{d(off)}$		-	59.6	-	
Fall Time	t_f		-	27.2	-	
Input Capacitance	C_{lss}	V_{DS}=50V, V_{GS}=0V, F=100kHz	-	878	-	pF
Output Capacitance	C_{oss}		-	34	-	
Reverse Transfer Capacitance	C_{rss}		-	1.5	-	
Effective Output Capacitance, Energy Related	$C_{o(er)}$	V_{GS}=0V, V_{DS}=0V-400V	-	21	-	
Effective Output Capacitance, Time Related	$C_{o(tr)}$		-	108	-	
Drain-Source Diode Characteristics and Maximum Ratings						
Peak Reverse Recovery Current	I_{rrm}	V_R=400V, I_S=2.5A, di/dt=100A/μs	-	15.8	-	A
Reverse Recovery Time	T_{rr}		-	216	-	ns
Reverse Recovery Charge	Q_{rr}		-	1.8	-	uc
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=5A	-	-	1.3	V

Note:

1. Calculated continuous current based on maximum allowable junction temperature.
2. Repetitive rating; pulse width limited by max. junction temperature.
3. Pd is based on max. junction temperature, using junction-case thermal resistance.
4. V_{DD}=100V, V_{GS}=10V, L=80mH, starting T_J=25°C.

Typical Electrical and Thermal Characteristic Curves

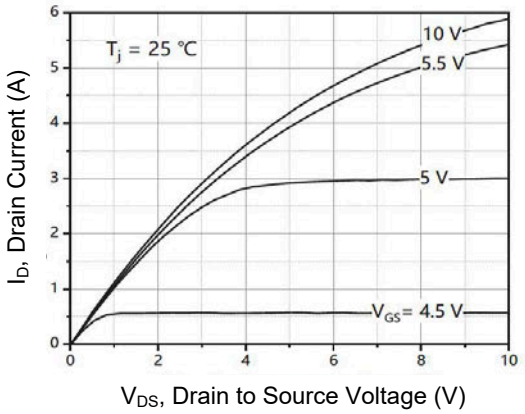


Figure 1. Output Characteristics

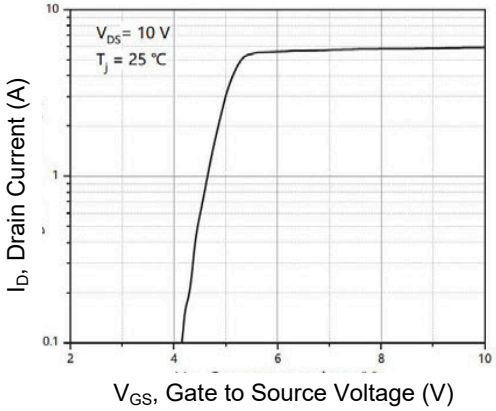


Figure 2. Transfer Characteristics

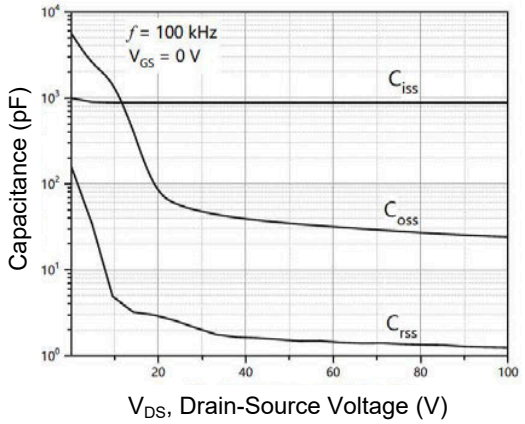


Figure 3. Capacitance Characteristics

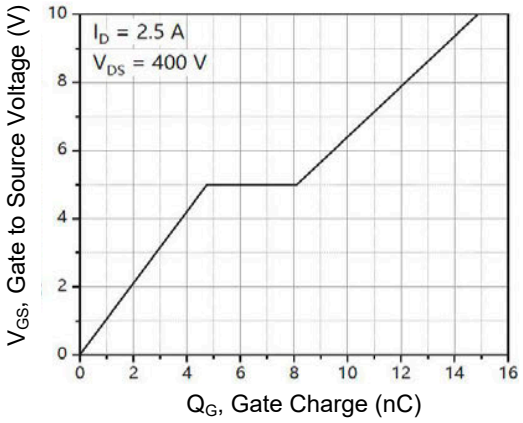


Figure 4. Gate Charge

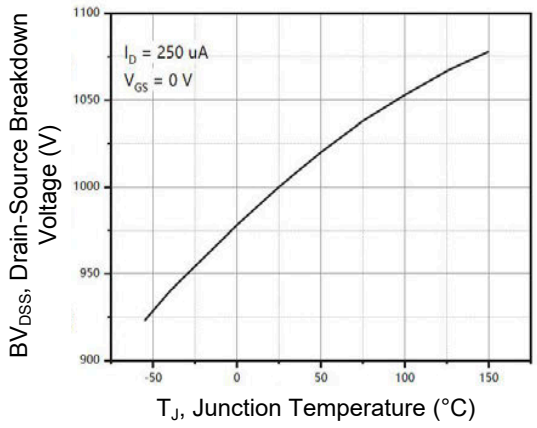


Figure 5. Drain-Source Breakdown Voltage

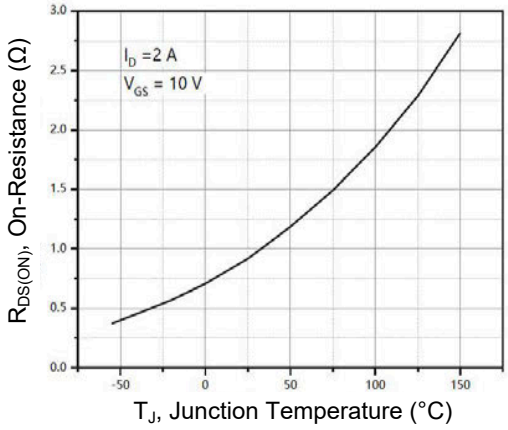


Figure 6. Drain-Source On-State Resistance

Typical Electrical and Thermal Characteristic Curves

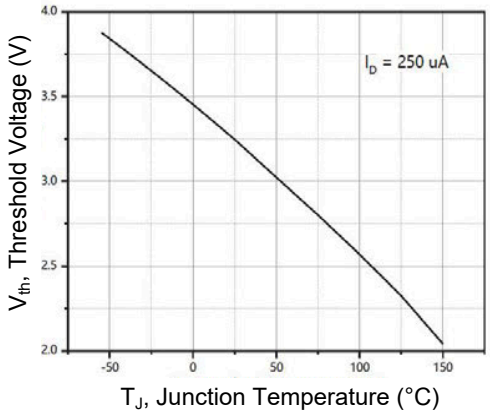


Figure 7. Threshold Voltage

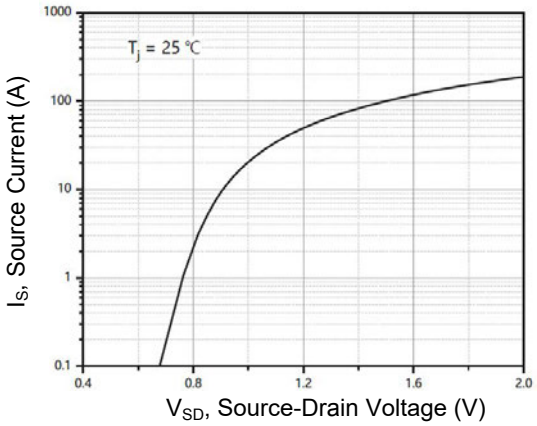


Figure 8. Forward Characteristics of Body Diode

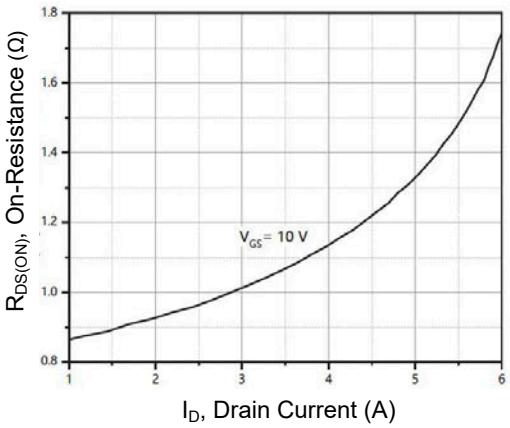


Figure 9. $R_{DS(ON)}$ vs. Drain Current

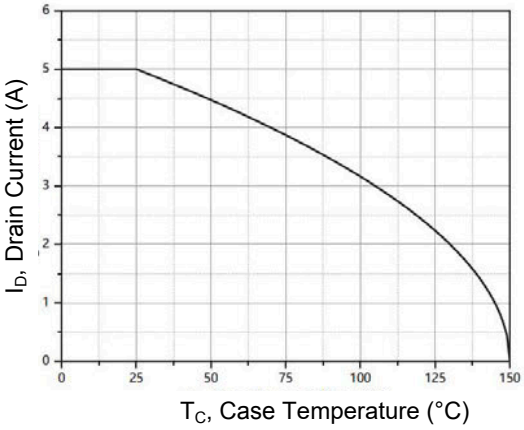


Figure 10. Drain Current

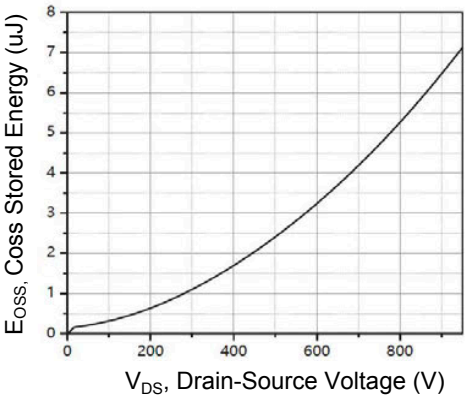


Figure 11. Typ. Coss Stored Energy

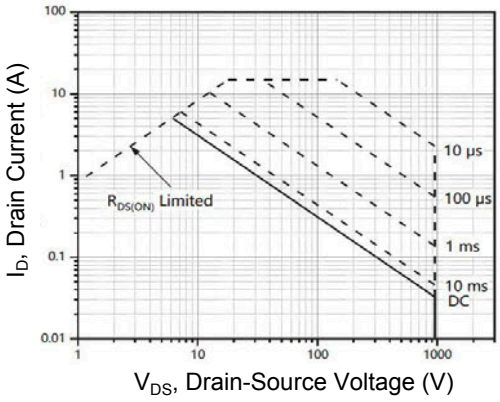


Figure 12. Safe Operation Area, T_C=25°C

Typical Electrical and Thermal Characteristic Curves

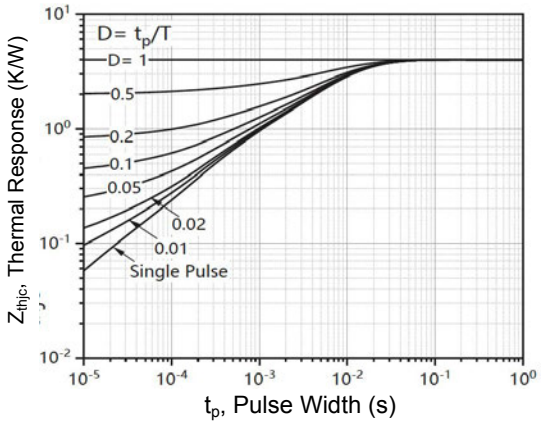
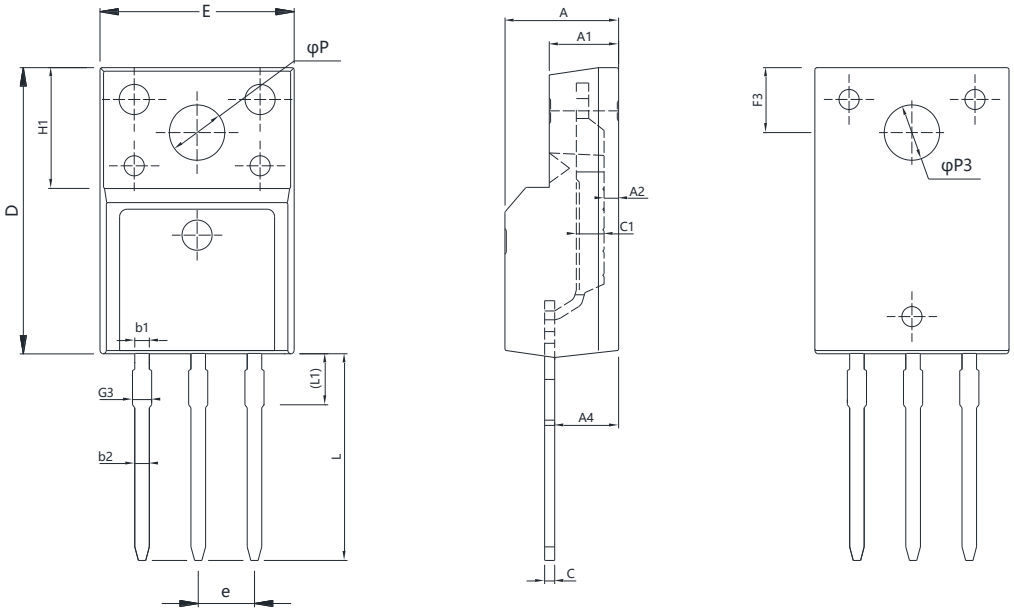


Figure 13. Max. Transient Thermal Impedance

Package Outline Dimensions (TO-220F)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
E	9.960	10.360	0.392	0.408
A	4.500	4.900	0.177	0.193
A1	2.340	2.740	0.092	0.108
A2	0.300	0.600	0.012	0.024
A4	2.560	2.960	0.101	0.117
c	0.400	0.650	0.016	0.026
C1	1.200	1.350	0.047	0.053
D	15.570	16.170	0.613	0.637
H1	6.700 REF		0.264 REF	
e	2.540 BSC		0.100 BSC	
L	12.680	13.280	0.499	0.523
L1	2.880	3.180	0.113	0.125
θP	3.030	3.380	0.119	0.133
θP3	3.150	3.650	0.124	0.144
F3	3.150	3.450	0.124	0.136
G3	1.250	1.550	0.049	0.061
b1	1.180	1.430	0.046	0.056
b2	0.700	0.950	0.028	0.037