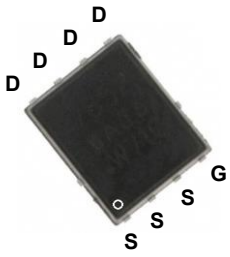
GOOD-ARK SEMICONDUCTOR

GSFP02210

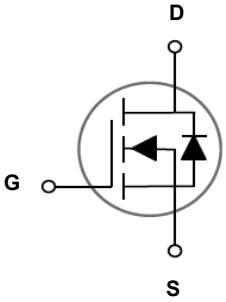
20V N-Channel MOSFET

Main Product Characteristics

BV_{DSS}	20V
$R_{DS(ON)}$	1.4mΩ
I_D	210A



PPAK5X6



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 GSFP02210 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°C unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±12	V
Drain Current-Continuous (T_C=25°C)	I_D	210	A
Drain Current-Continuous (T_C=100°C)		130	
Drain Current-Pulsed[1]	I_{DM}	840	A
Single Pulse Avalanche Energy[2]	E_{AS}	605	mJ
Single Pulse Avalanche Current[2]	I_{AS}	110	A
Power Dissipation (T_C=25°C)	P_D	142	W
Power Dissipation-Derate above 25°C		1.14	W/°C
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.88	°C/W
Operating Junction Temperature Range	T_J	-50 To +150	°C
Storage Temperature Range	T_{STG}	-50 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=250μA	20	-	-	V
BV_{DSS} Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to 25°C, I_D=1mA	-	0.013	-	V/°C
Drain-Source Leakage Current	I_{DSS}	V_{DS}=20V, V_{GS}=0V, T_J=25°C	-	-	1	μA
		V_{DS}=16V, V_{GS}=0V, T_J=125°C	-	-	10	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±12V, V_{DS}=0V	-	-	100	nA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=15A	-	1.1	1.4	mΩ
		V_{GS}=2.5V, I_D=10A	-	1.24	1.7	
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=250μA	0.4	0.6	1.0	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		-	-3.5	-	mV/°C
Forward Transconductance	g_{fs}	V_{DS}=10V, I_D=3A	-	30	-	S
Dynamic and Switching Characteristics						
Total Gate Charge[3,4]	Q_g	V_{DS}=16V, I_D=10A, V_{GS}=4.5V	-	173	260	nC
Gate-Source Charge[3,4]	Q_{gs}		-	35	53	
Gate-Drain Charge[3,4]	Q_{gd}		-	34	51	
Turn-On Delay Time[3,4]	$t_{d(on)}$	V_{DD}=10V, R_G=3.3Ω, V_{GS}=4.5V, I_D=1A	-	30	60	nS
Rise Time[3,4]	t_r		-	80	160	
Turn-Off Delay Time[3,4]	$t_{d(off)}$		-	180	360	
Fall Time[3,4]	t_f		-	60	120	
Input Capacitance	C_{lss}	V_{DS}=16V, V_{GS}=0V, F=1MHz	-	11950	17900	pF
Output Capacitance	C_{oss}		-	1347	2020	
Reverse Transfer Capacitance	C_{rss}		-	1008	1500	
Gate Resistance	R_g	V_{GS}=0V, V_{DS}=0V, F=1MHz	-	1.35	-	Ω
Drain-Source Diode Characteristics and Maximum Ratings						
Continuous Source Current	I_S	V_G=V_D=0V, Force Current	-	-	210	A
Pulsed Source Current	I_{SM}		-	-	420	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=1A, T_J=25°C	-	-	1	V

Note:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2. V_{DD}=20V, V_{GS}=10V, L=0.1mH, I_{AS}=110A, R_G=25Ω,starting T_J=25°C.
3. Pulse test: pulse width ≤300us,duty cycle≤2%.
4. Essentially independent of operating temperature.

Typical Electrical and Thermal Characteristic Curves

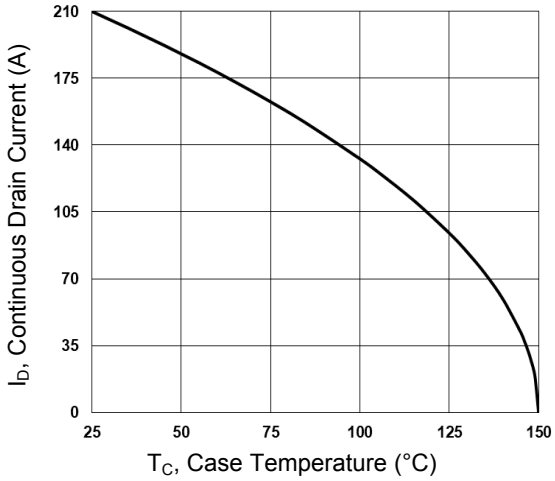


Figure 1. Continuous Drain Current vs. T_C

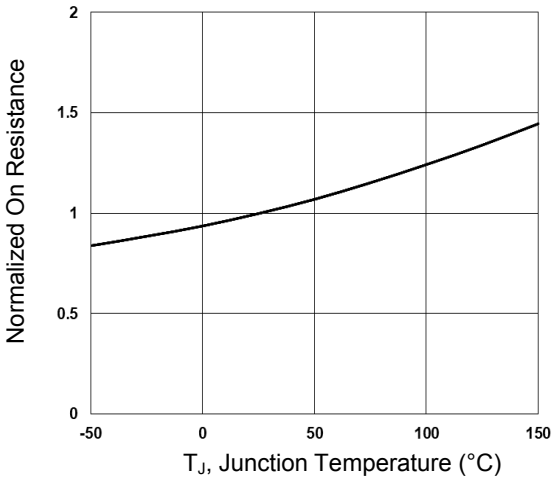


Figure 2. Normalized R_{DSON} vs. T_J

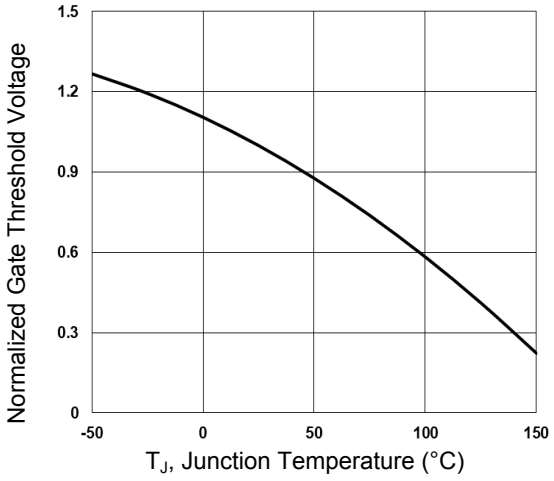


Figure 3. Normalized V_{th} vs. T_J

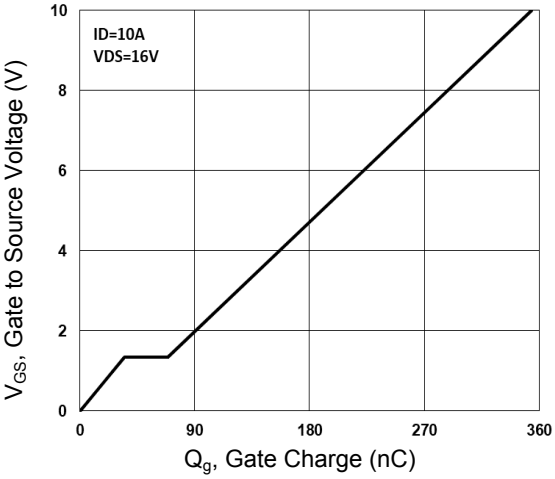


Figure 4. Gate Charge Waveform

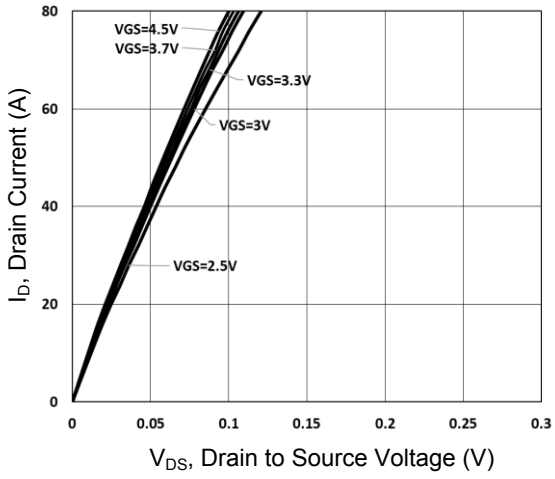


Figure 5. Typical Output Characteristics

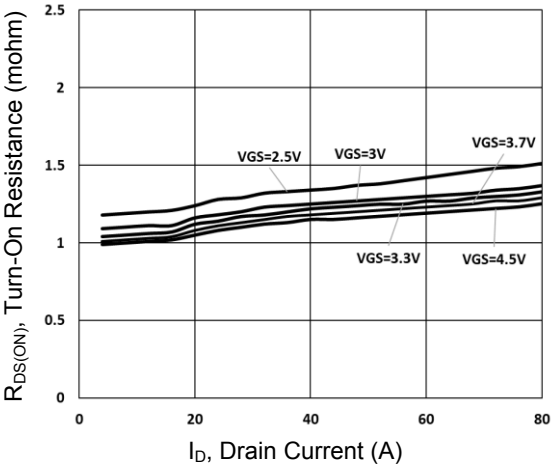


Figure 6. Turn-On Resistance vs. I_D

Typical Electrical and Thermal Characteristic Curves

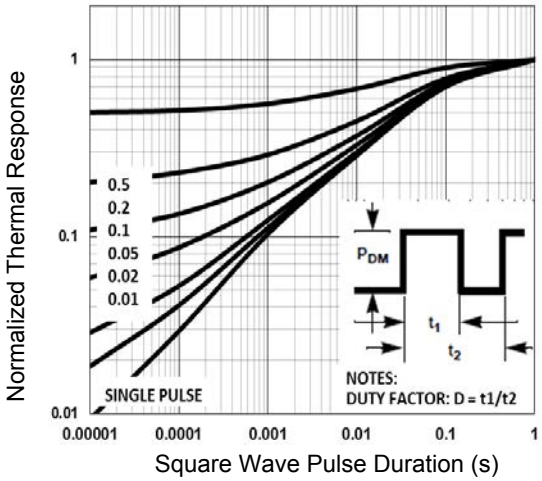


Figure 7. Normalized Transient Impedance

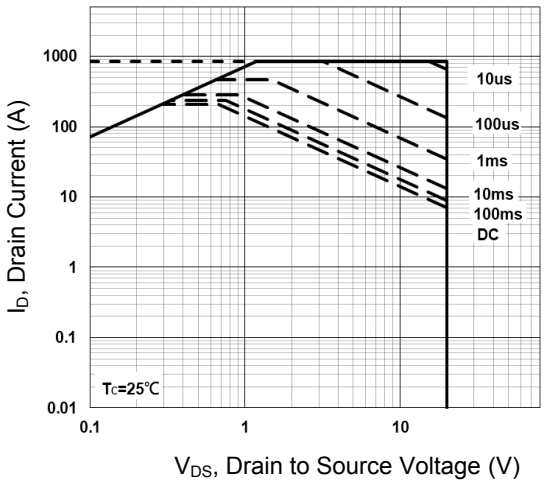


Figure 8. Maximum Safe Operation Area

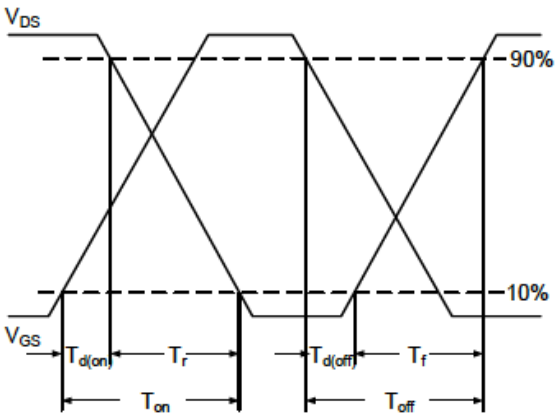


Figure 9. Switching Time Waveform

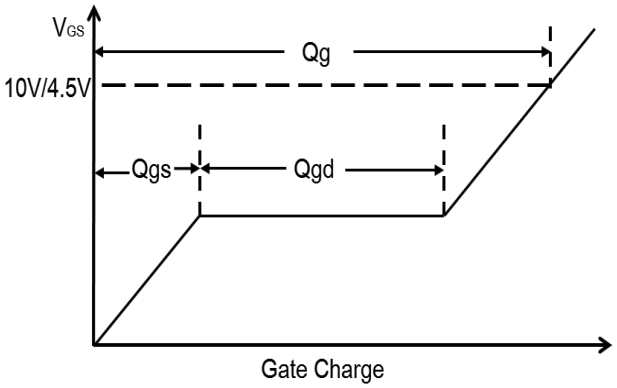
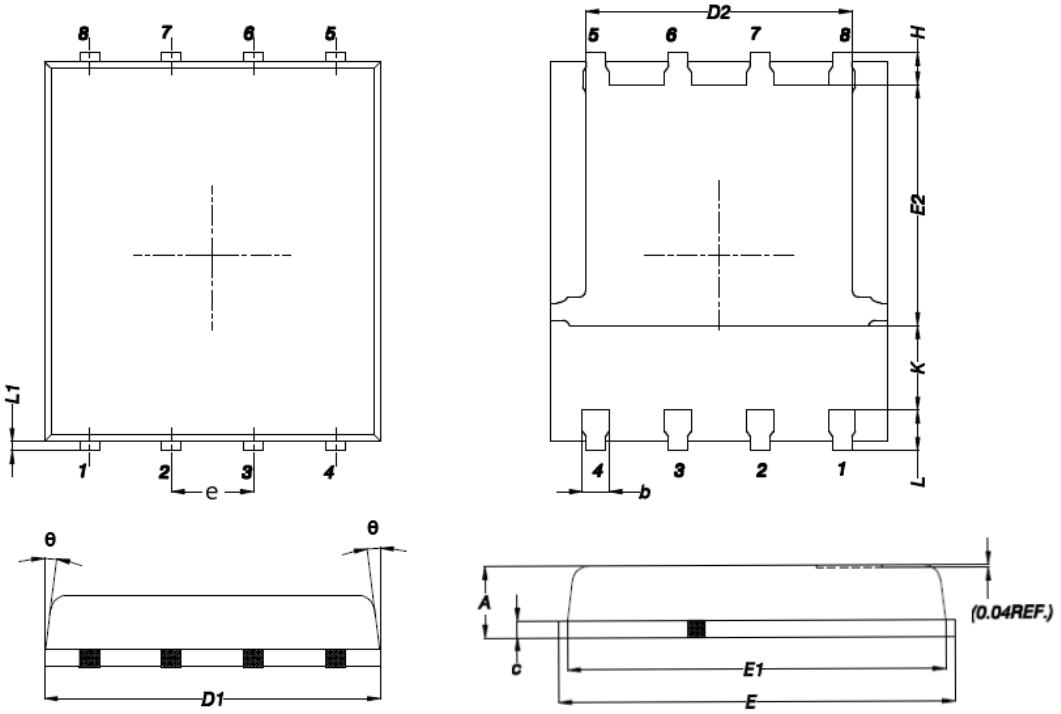


Figure 10. Gate Charge Waveform

Package Outline Dimensions (PPAK5x6)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	1.200	0.850	0.047	0.031
b	0.510	0.300	0.020	0.012
C	0.300	0.200	0.012	0.008
D1	5.400	4.800	0.212	0.189
D2	4.310	3.610	0.170	0.142
E	6.300	5.850	0.248	0.230
E1	5.960	5.450	0.235	0.215
E2	3.920	3.300	0.154	0.130
e	1.27BSC		0.05BSC	
H	0.650	0.380	0.026	0.015
K	-	1.100	-	0.043
L	0.710	0.380	0.028	0.015
L1	0.250	0.050	0.009	0.002
θ	12°	0°	12°	0°