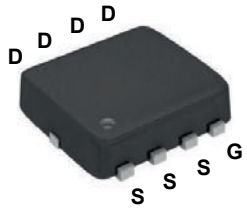
GOOD-ARK SEMICONDUCTOR

GSGN6R204

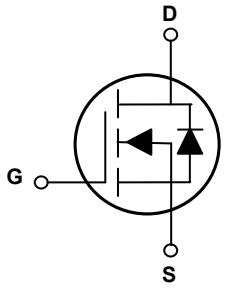
40V N-Channel MOSFET

Main Product Characteristics

$V_{(BR)DSS}$	40V
$R_{DS(ON)}$	6.2mΩ (Max.)
I_D	41A



PPAK3x3



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 GSGN6R204 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	Value	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-to-Source Voltage	V_{GS}	±20	V
Continuous Drain Current, @ Steady-State (T_C=25°C)	I_D	41	A
Continuous Drain Current, @ Steady-State (T_C=100°C)		28	A
Pulsed Drain Current (T_C=25°C)[1]	I_{DM}	164	A
Power Dissipation (T_C=25°C)[2]	P_D	39	W
Single Pulse Avalanche Energy[5]	E_{AS}	33.6	mJ
Single Pulse Current	I_{AS}	11.6	A
Junction-to-Ambient (PCB Mounted, Steady-State)	$R_{\theta JA}$	40	°C/W
Junction-to-Case	$R_{\theta JC}$	3.2	°C/W
Operating Junction and Storage Temperature Range	T_J/T_{STG}	-55 to +150	°C
Soldering Temperature (SMD)	T_{sold}	260	°C

Electrical Characteristics (T_A=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
On / Off Characteristics						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250μA	40	-	-	V
Drain-to-Source Leakage Current	I_{DSS}	V_{DS}=40V, V_{GS}=0V, T_J=25°C	-	-	1.0	μA
		V_{DS}=40V, V_{GS}=0V, T_J=125°C	-	2.0	-	
Gate-to-Source Forward Leakage	I_{GSS}	V_{DS}=0V, V_{GS}=±20V	-	-	±100	nA
Static Drain-to-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=20A	-	5.1	6.2	mΩ
		V_{GS}=4.5V, I_D=20A	-	7.3	9.5	
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1.1	-	2.8	V
Dynamic and Switching Characteristics						
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=15V, f=1MHz	-	860	-	pF
Output Capacitance	C_{oss}		-	495	-	
Reverse Transfer Capacitance	C_{rss}		-	36	-	
Total Gate Charge[3,4]	Q_g	I_D=9A, V_{DD}=15V, V_{GS}=10V	-	15.5	-	nC
Gate-to-Source Charge[3,4]	Q_{gs}		-	3.2	-	
Gate-to-Drain ("Miller") Charge[3,4]	Q_{gd}		-	2.2	-	
Gate to Plateau[3,4]	$V_{plateau}$		-	3.3	-	V
Turn-on Delay Time[3,4]	$t_{d(on)}$	V_{DD}=20V, V_{GS}=10V, R_G=3Ω, I_D=9A	-	4.4	-	nS
Rise Time[3,4]	t_r		-	31	-	
Turn-Off Delay Time[3,4]	$t_{d(off)}$		-	21	-	
Fall Time[3,4]	t_f		-	12	-	
Gate Resistance	R_g	f=1MHz	-	2.2	-	Ω
Source-Drain Ratings and Characteristics						
Continuous Source Current (Body Diode)	I_S	MOSFET symbol showing the integral reverse p-n junction diode.	-	-	41	A
Diode Pulse Current	$I_{S.pulse}$		-	-	164	A
Diode Forward Voltage	V_{SD}	I_S=5A, V_{GS}=0V	-	-	1.4	V
Reverse Recovery Time[3]	T_{rr}	I_S=2A, V_{GS}=0V, V_R=30V, dI_F/dt=100A/us	-	29	-	nS
Reverse Recovery Charge[3]	Q_{rr}		-	14	-	nC

Notes:

1. Pulse time of 5μs.
2. The dissipated power value will change with the temperature. When it is greater than 25°C, the dissipated power value will decrease by 0.55°C/W for every 1 degree of temperature increase.
3. Pulse test: Pulse width ≤ 300μs, duty cycle ≤ 2%.
4. Basically unaffected by operating temperature.
5. L=0.5mH, R_G=25Ω, V_{DD}=24V, T_J=25°C.

Typical Electrical and Thermal Characteristic Curves

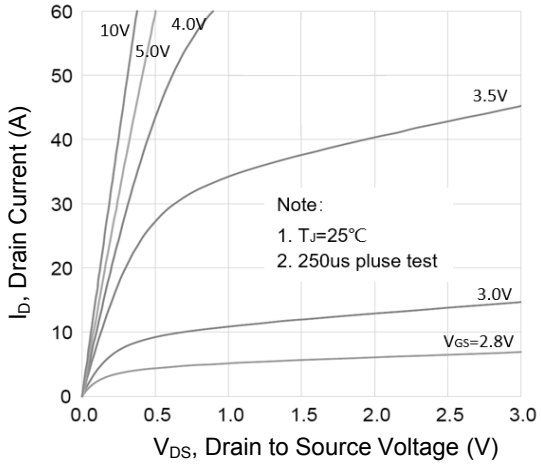


Figure 1. Typical Output Characteristics

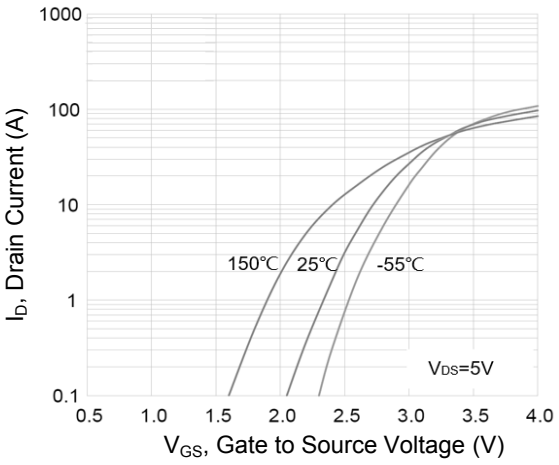


Figure 2. Transfer Characteristics

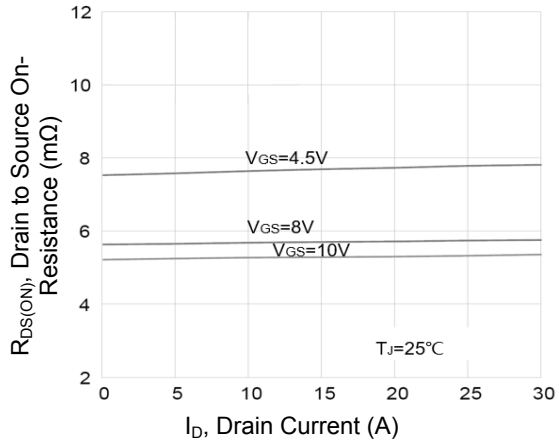


Figure 3. $R_{DS(ON)}$ vs. Drain Current

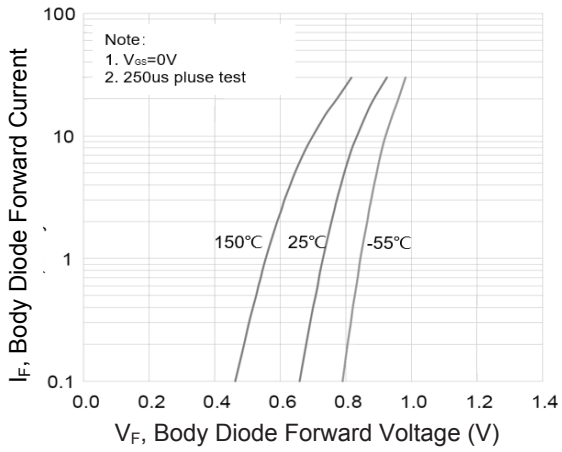


Figure 4. Body Diode Characteristics

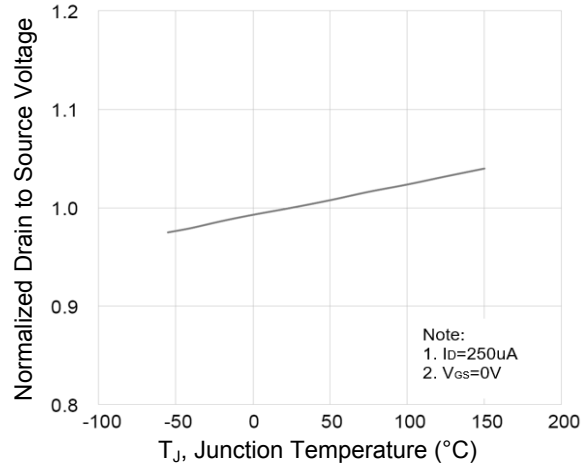


Figure 5. Normalized BV_{DSS} vs. T_J

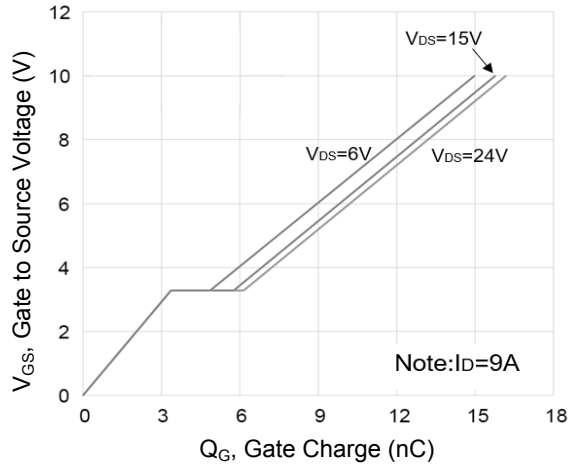


Figure 6. Gate Charge

Typical Electrical and Thermal Characteristic Curves

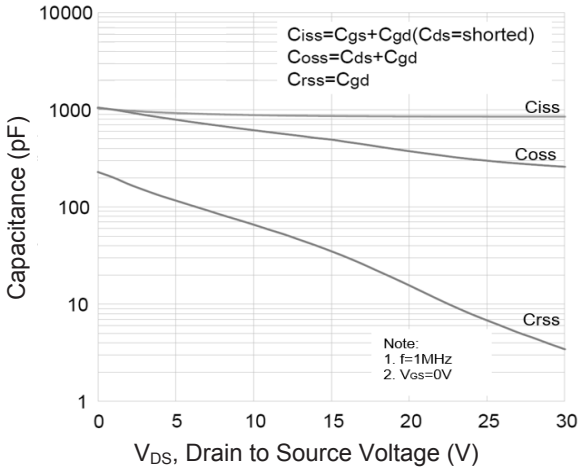


Figure 7. Capacitance Characteristics

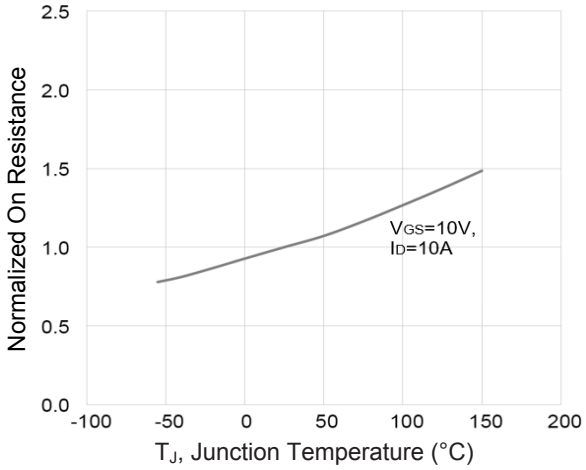


Figure 8. Normalized $R_{DS(ON)}$ vs. T_J

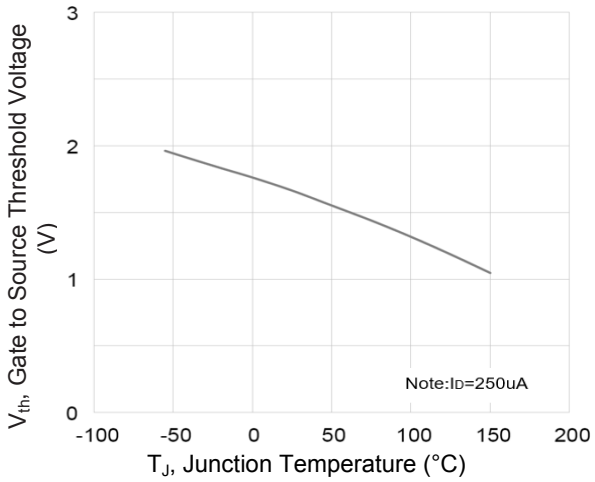


Figure 9. V_{th} vs. T_J

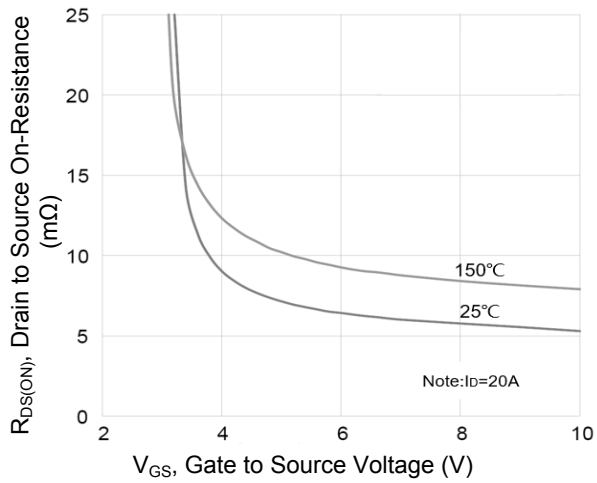
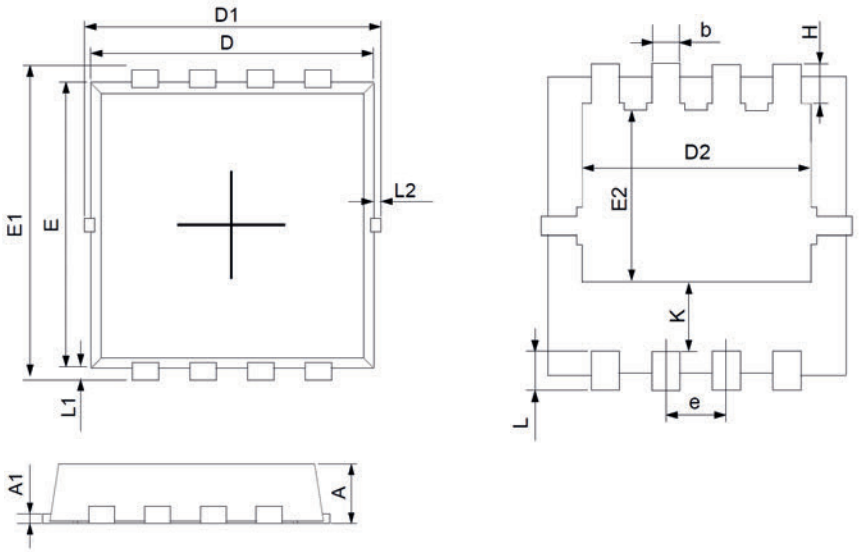


Figure 10. $R_{DS(ON)}$ vs. Gate to Source Voltage

Package Outline Dimensions (PPAK3x3)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.70	0.90	0.028	0.035
A1	0.14	0.20	0.006	0.008
D	3.05	3.25	0.120	0.128
E	2.90	3.10	0.114	0.122
D1	3.10	3.50	0.122	0.138
D2	2.35	2.50	0.093	0.098
E1	3.10	3.50	0.122	0.138
E2	1.64	1.84	0.065	0.072
b	0.25	0.35	0.010	0.014
k	0.59	0.79	0.023	0.031
e	0.55	0.75	0.022	0.030
E4	3.34	3.92	0.131	0.154
L	0.25	0.55	0.010	0.022
L1	0.10	0.20	0.004	0.008
H	0.32	0.52	0.013	0.020

Order Information

Device	Package	Marking	Carrier	Quantity
GSGN6R204	PPAK3x3	N6R204	Tape & Reel	5,000pcs / Reel