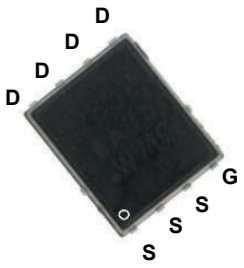
GOOD-ARK SEMICONDUCTOR

GSGP6R504

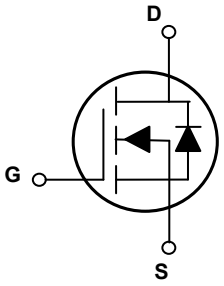
40V N-Channel MOSFET

Main Product Characteristics

$V_{(BR)DSS}$	40V
$R_{DS(ON)}$	6.5mΩ (Max)
I_D	65A



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 GSGP6R504 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}	40	V
Gate-to-Source Voltage	V_{GS}	±20	V
Continuous Drain Current, @ Steady-State (T_C=25°C)	I_D	65	A
Continuous Drain Current, @ Steady-State (T_C=100°C)		43	A
Pulsed Drain Current (T_C=25°C)[1]	I_{DM}	260	A
Power Dissipation (T_C=25°C)[2]	P_D	47	W
Single Pulse Avalanche Energy[5]	E_{AS}	33.6	mJ
Single Pulse Current	I_{AS}	11.6	A
Thermal Resistance Junction-to-Ambient (PCB Mounted, Steady-State)	$R_{\theta JA}$	40	°C/W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	2.66	°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	6.5	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
Drain-Source Ratings and Characteristics						
Continuous Source Current (Body Diode)	I_S	MOSFET symbol showing the integral reverse p-n junction diode.	-	-	65	A
Diode Pulse Current	$I_{S.pulse}$		-	-	260	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

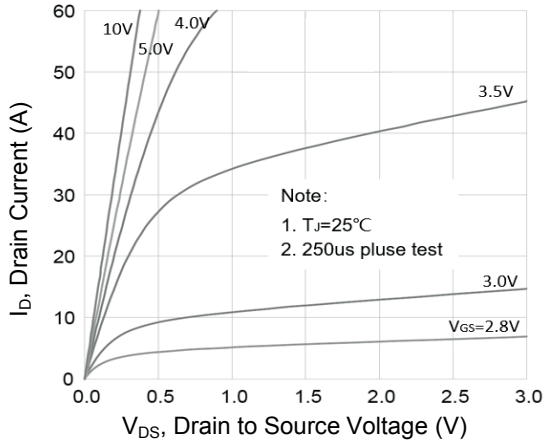


Figure 1. Typical Output Characteristics

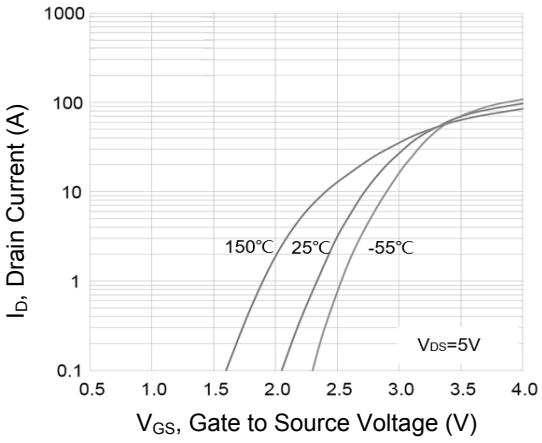


Figure 2. Transfer Characteristics

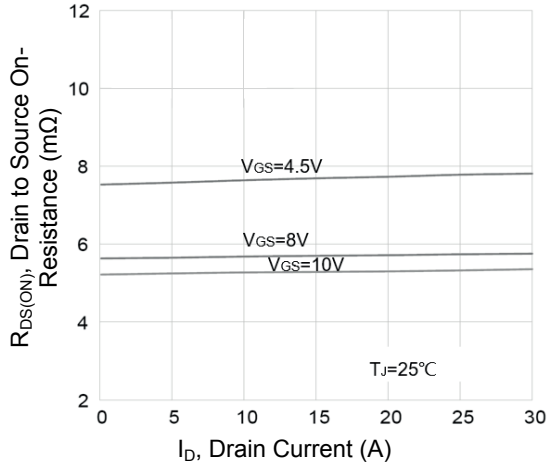


Figure 3. $R_{DS(ON)}$ vs. Drain Current

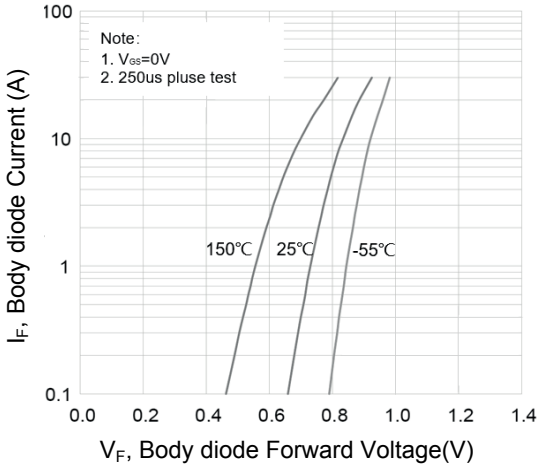


Figure 4. Body Diode Characteristics

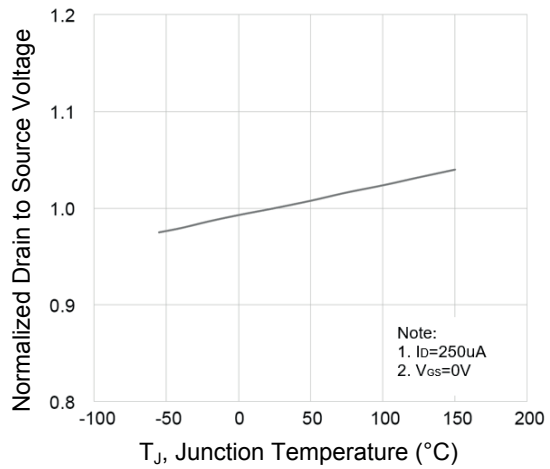


Figure 5. Normalized BV_{DSS} vs. T_J

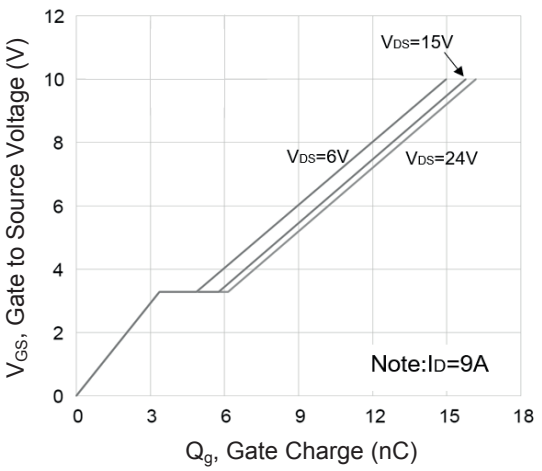


Figure 6. Gate Charge

Typical Electrical and Thermal Characteristic Curves

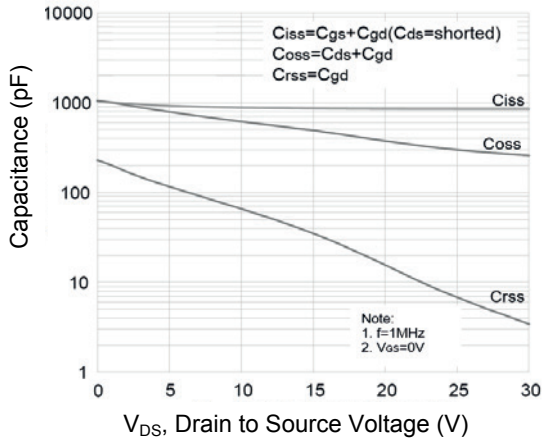


Figure 7. Capacitance Characteristics

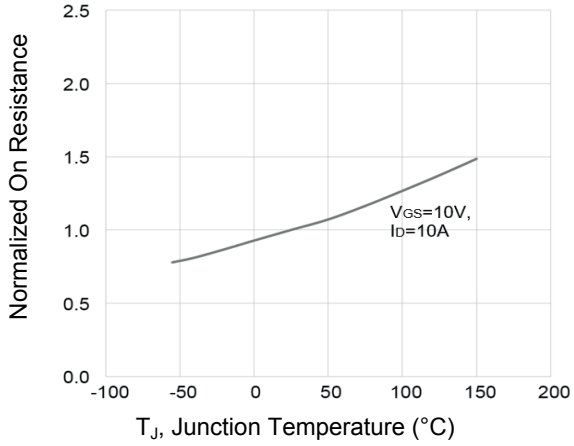


Figure 8. Normalized $R_{DS(ON)}$ vs. T_J

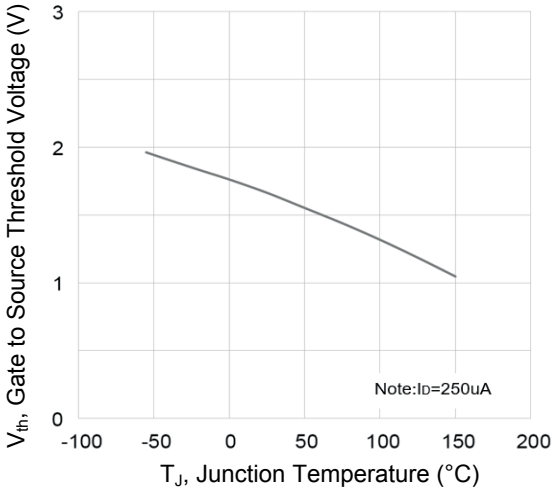


Figure 9. V_{th} vs. T_J

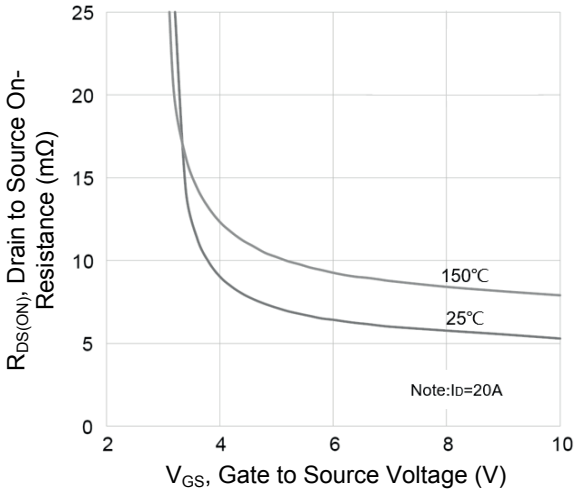
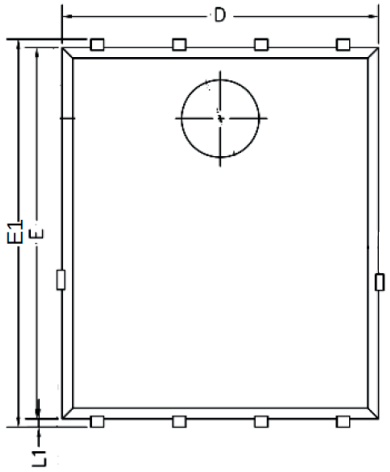
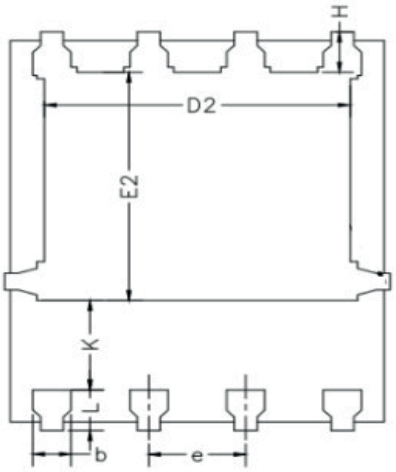


Figure 10. $R_{DS(ON)}$ vs. V_{GS}

Package Outline Dimensions (PPAK5x6)



TOP VIEW



BOTTOM VIEW

SIDE VIEW

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.90	1.20	0.035	0.047
b	0.30	0.55	0.012	0.022
C	0.15	0.35	0.006	0.014
D	4.70	5.20	0.185	0.205
D2	3.76	4.20	0.148	0.165
E2	3.30	3.85	0.130	0.152
E	5.60	5.90	0.220	0.232
E1	5.80	6.20	0.228	0.244
K	1.10	-	0.043	-
H	0.45	0.75	0.018	0.030
L	0.45	0.75	0.018	0.030
L1	0.25	0.45	0.010	0.018
e	1.27 BSC		0.050 BSC	

Order Information

Device	Package	Marking	Carrier	Quantity
GSGP6R504	PPAK5x6	P6R504	Tape & Reel	5,000 Pcs / Reel