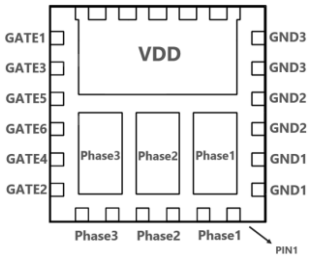
GOOD-ARK SEMICONDUCTOR

GSMP04150

40V 6 IN 1 N-Channel MOSFETs

Main Product Characteristics

BV_{DSS}	40V
$R_{DS(ON)}$	2.2mΩ
I_D	150A



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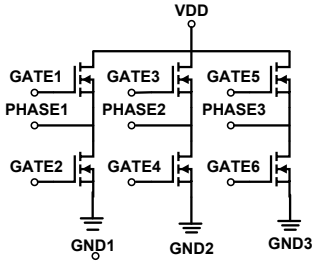


Schematic Diagram

Features and Benefits

- Advanced MOSFET process technology
- Ideal for 3-phase motor driver or invertor
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery

Description

The GSMP04150 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}	40	V
Gate-Source Voltage	V_{GS}	+20/-12	V
Drain Current-Continuous (T_C=25°C)	I_D	150	A
Drain Current-Continuous (T_C=100°C)		95	
Drain Current-Pulsed[1]	I_{DM}	600	A
Single Pulse Avalanche Energy[2]	E_{AS}	320	mJ
Single Pulse Avalanche Current[2]	I_{AS}	80	A
Power Dissipation (T_C=25°C)	P_D	86	W
Power Dissipation-Derate above 25°C		1.45	W/°C
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	5.06	°C/W
Operating 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=250μA	40	-	-	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=40V,V_{GS}=0V,T_J=25°C	-	-	1	μA
		V_{DS}=32V,V_{GS}=0V,T_J=85°C	-	-	10	
Gate-Source Leakage Current	I_{GSS}	V_{GS}=20V, V_{DS}=0V	-	-	±100	nA
Static Drain-Source On-Resistance	$R_{DS(ON)}$ [3]	V_{GS}=10V, I_D=40A	-	1.8	2.2	mΩ
	$R_{DS(ON)}$ [4]	V_{GS}=10V, I_D=40A	-	2.2	2.6	
	$R_{DS(ON)}$ [5]	V_{GS}=10V, I_D=40A	-	2.8	3.5	
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=250μA	2.0	2.8	4.0	V
Forward Transconductance	g_{fs}	V_{DS}=10V, I_D=5A	-	15	-	S
Dynamic and Switching Characteristics						
Total Gate Charge[6,7]	Q_g	V_{DS}=20V, I_D=70A, V_{GS}=10V	-	58.4	88	nC
Gate-Source Charge[6,7]	Q_{gs}		-	14.3	21.5	
Gate-Drain Charge[6,7]	Q_{gd}		-	12.0	20	
Turn-On Delay Time[6,7]	$t_{d(on)}$	V_{DD}=20V, R_G=6Ω, V_{GS}=10V, I_D=1A	-	14.6	-	nS
Rise Time[6,7]	t_r		-	21.5	-	
Turn-Off Delay Time[6,7]	$t_{d(off)}$		-	52	-	
Fall Time[6,7]	t_f		-	83.5	-	
Input Capacitance	C_{lss}	V_{DS}=20V, V_{GS}=0V, F=1MHz	-	3310	4965	pF
Output Capacitance	C_{oss}		-	1090	1650	
Reverse Transfer Capacitance	C_{rss}		-	100	150	
Drain-Source Diode Characteristics and Maximum Ratings						
Continuous Source Current	I_S	V_G=V_D=0V, Force Current	-	-	150	A
Pulsed Source Current	I_{SM}		-	-	300	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=1A, T_J=25°C	-	-	1	V
Reverse Recovery Time	t_{rr}	V_R=30V, I_S=10A, di/dt=100A/μs, T_J=25°C	-	38	-	nS
Reverse Recovery Charge	Q_{rr}		-	90	-	nC

Note:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2. V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=80A, R_G=25Ω, starting T_J=25°C.
3. The $R_{DS(ON)}$ value is the position of M1, M2, M3 and M5.
4. The $R_{DS(ON)}$ value is the position of M4.
5. The $R_{DS(ON)}$ value is the position of M6.
6. Pulse test: pulse width≤300us,duty cycle ≤2%.
7. Essentially independent of operation temperature.

Typical Electrical and Thermal Characteristic Curves

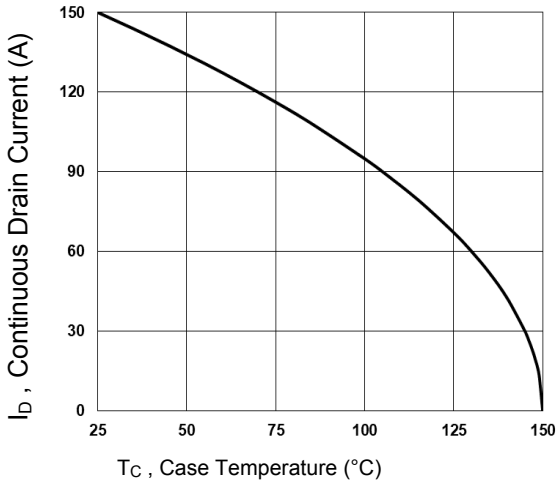


Fig.1 Continuous Drain Current vs. T_C

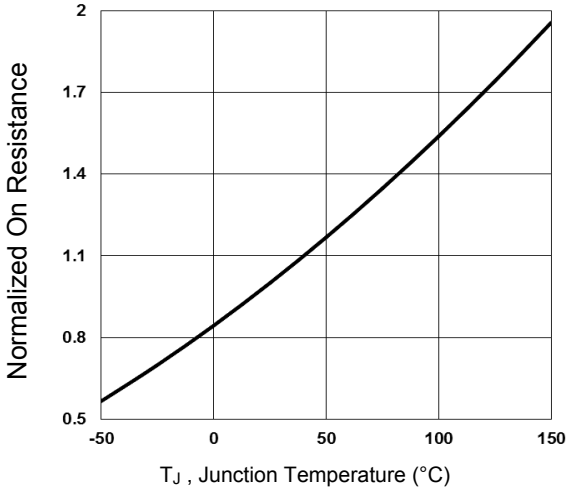


Fig.2 Normalized $R_{DS(ON)}$ vs. T_J

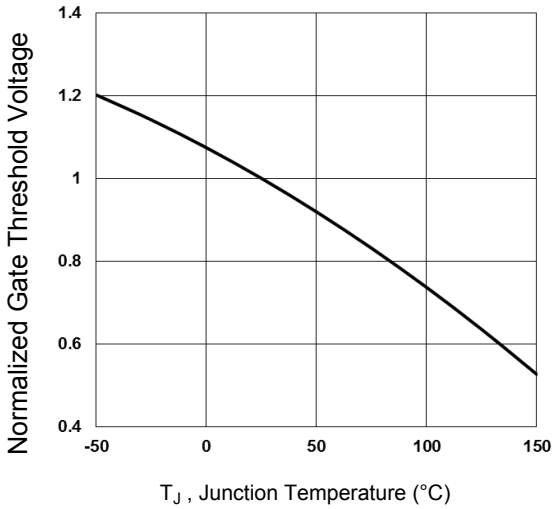


Fig.3 Normalized V_{th} vs. T_J

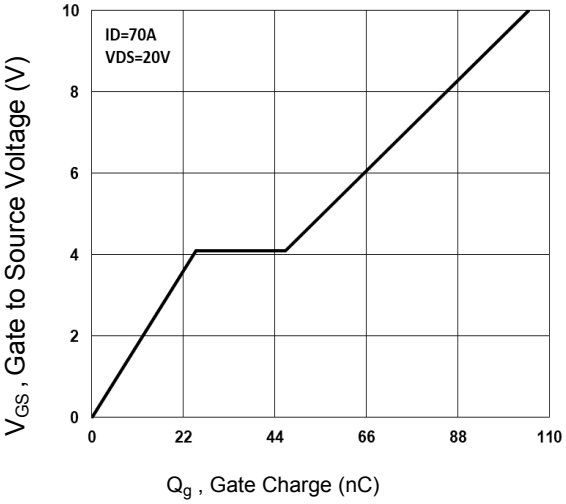


Fig.4 Gate Charge Waveform

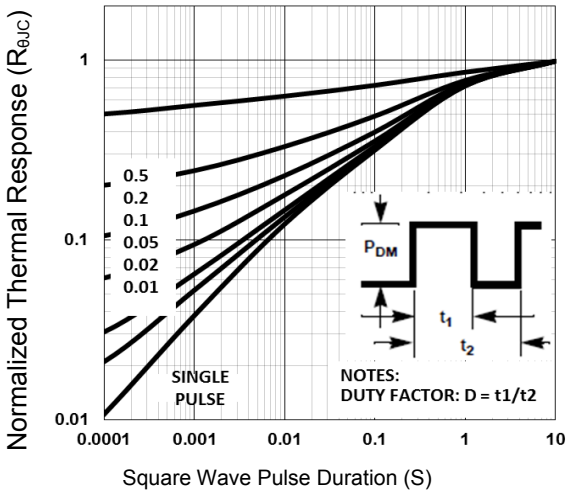


Fig.5 Normalized Transient Impedance

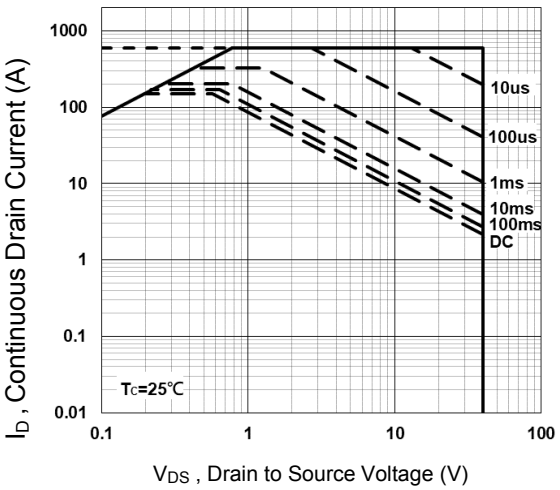


Fig.6 Maximum Safe Operation Area

Typical Electrical and Thermal Characteristic Curves

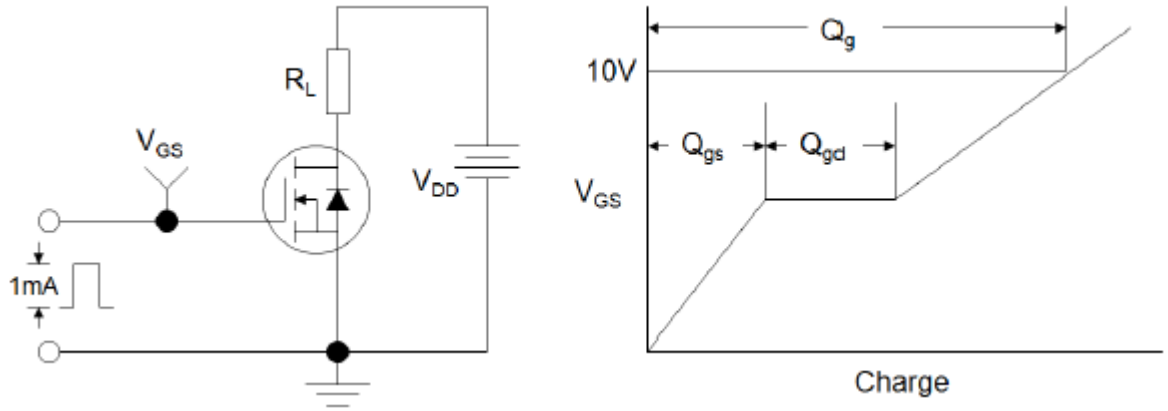


Figure 7. Gate Charge Test Circuit & Waveform

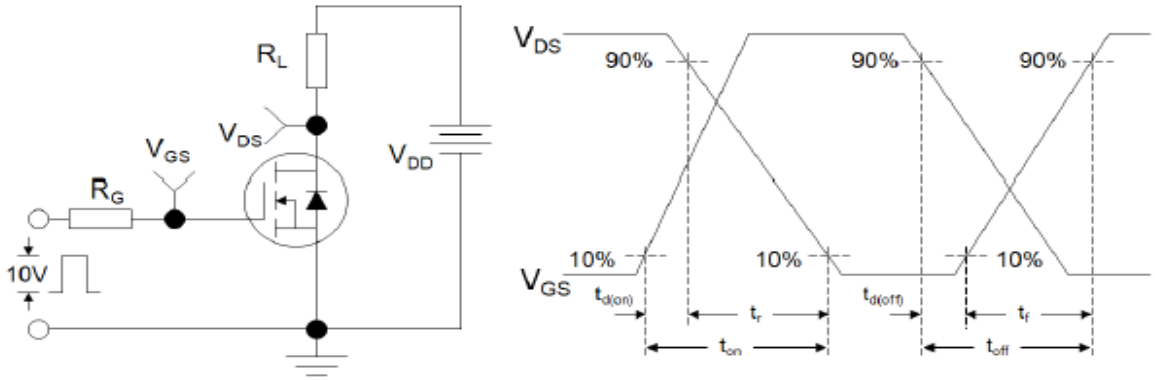


Figure 8. Resistive Switching Test Circuit & Waveforms

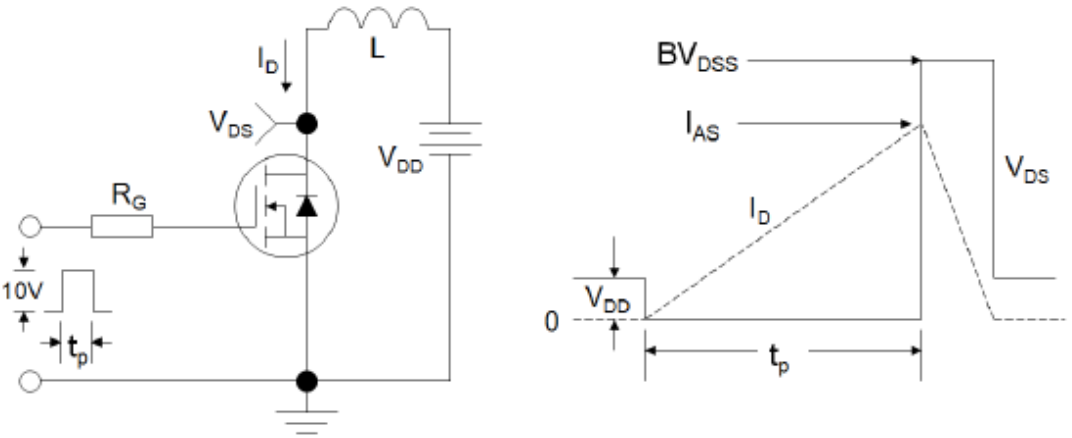
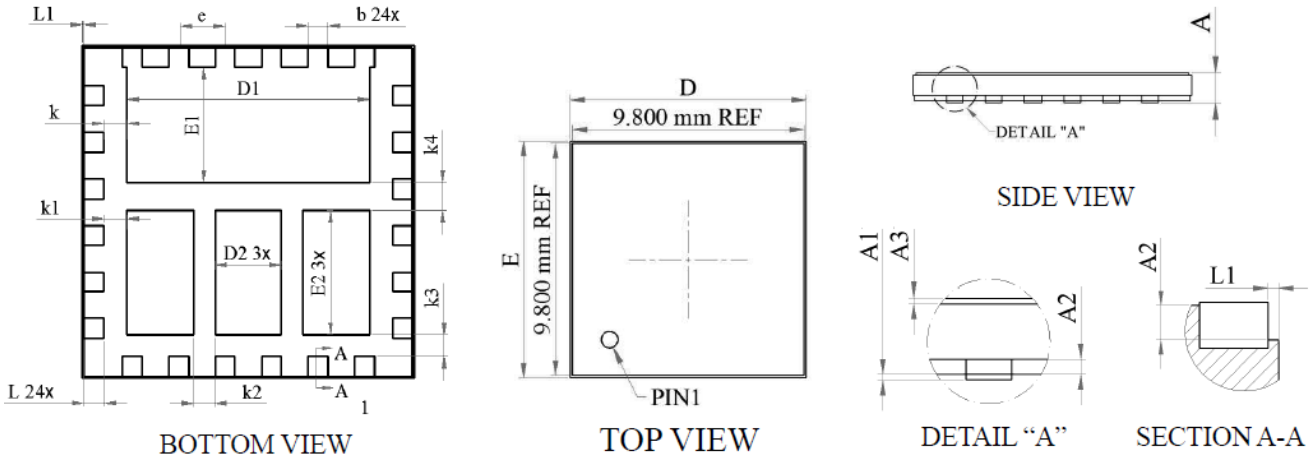


Figure 9. E_{AS} Circuit & Waveforms

Package Outline Dimensions DFN10x10



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Normal	Max	Min	Normal	Max
A	0.950	-	1.050	0.038	-	0.041
A1	-	-	0.005	-	-	0.000
A2	0.080	-	0.250	0.003	-	0.010
A3	0.050	0.075	0.100	0.002	0.003	0.004
D	9.900	10.000	10.100	0.390	0.394	0.398
E	9.900	10.000	10.100	0.390	0.394	0.398
D1	7.200	7.300	7.400	0.283	0.287	0.291
E1	3.350	3.450	3.550	0.132	0.136	0.140
D2	1.900	2.000	2.100	0.075	0.079	0.083
E2	3.650	3.750	3.850	0.144	0.148	0.152
b	0.500	0.600	0.700	0.020	0.024	0.028
L	0.500	0.600	0.700	0.020	0.024	0.028
L1	0.010	0.050	0.090	0.000	0.002	0.004
k	0.700 REF			0.028 REF		
k1	0.700 REF			0.028 REF		
k2	0.650 REF			0.026 REF		
k3	0.650 REF			0.026 REF		
k4	0.850 REF			0.033 REF		
e	1.400 BSC			0.055 BSC		