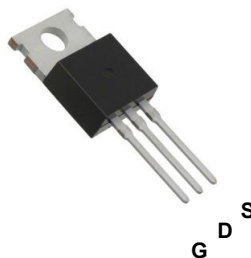
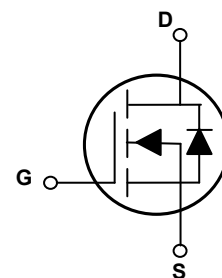


Main Product Characteristics

BV_{DSS}	40V
$R_{DS(ON)}$	1.8m Ω
I_D	210A



TO-220



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 GSGH04210 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 ($T_C=25^\circ\text{C}$ 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 ($T_C=25^\circ\text{C}$)	I_D	210	A
Drain Current-Continuous ($T_C=100^\circ\text{C}$)		134	A
Drain Current-Pulsed ¹	I_{DM}	840	A
Single Pulse Avalanche Energy ²	E_{AS}	660	mJ
Single Pulse Avalanche Current ²	I_{AS}	115	A
Power Dissipation ($T_C=25^\circ\text{C}$)	P_D	160	W
Power Dissipation-Derate Above 25 $^\circ\text{C}$		1.28	W/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.78	$^\circ\text{C/W}$
Storage Temperature Range	T_{STG}	-55 To +150	$^\circ\text{C}$
Operating Junction Temperature Range	T_J	-55 To +150	$^\circ\text{C}$

Electrical Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	40	-	-	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=40V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	-	-	1	μA
		$V_{DS}=32V, V_{GS}=0V, T_J=85^{\circ}\text{C}$	-	-	10	μA
Gate-Source Leakage Current	$I_{GSS(+)}$	$V_{GS}=20V, V_{DS}=0V$	-	-	100	nA
On Characteristics						
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$	-	1.5	1.8	m Ω
Gate Threshold Voltage	$\Delta V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	2.8	4	V
Forward Transconductance	g_{fs}	$V_{DS}=10V, I_D=3A$	-	50	-	S
Dynamic and Switching Characteristics						
Total Gate Charge ^{3,4}	Q_g	$V_{DS}=20V, I_D=80A, V_{GS}=10V$	-	107	160	nC
Gate-Source Charge ^{3,4}	Q_{gs}		-	29	44	
Gate-Drain Charge ^{3,4}	Q_{gd}		-	24	36	
Turn-On Delay Time ^{3,4}	$t_{d(on)}$	$V_{DD}=20V, R_G=6\Omega, V_{GS}=10V, I_D=80A$	-	28	42	nS
Rise Time ^{3,4}	t_r		-	42	63	
Turn-Off Delay Time ^{3,4}	$t_{d(off)}$		-	84	120	
Fall Time ^{3,4}	t_f		-	40	65	
Input Capacitance	C_{iss}	$V_{DS}=20V, V_{GS}=0V, F=1\text{MHz}$	-	7250	10800	pF
Output Capacitance	C_{oss}		-	2140	3210	
Reverse Transfer Capacitance	C_{rss}		-	140	210	
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}	$V_{GS}=0V, I_S=1A, T_J=25^{\circ}\text{C}$	-	-	1	V
Reverse Recovery Time	T_{rr}	$V_R=30V, I_S=10A, di/dt=100A/\mu s, T_J=25^{\circ}\text{C}$	-	86	-	nS
Reverse Recovery Charge	Q_{rr}		-	178	-	nC

Note:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=115A, R_G=25\Omega,$ starting $T_J=25^{\circ}\text{C}$.
3. Pluse test: pulse width $\leq 300\mu s,$ duty cycle $\leq 2\%$.
4. Essentially independent of operation temperature.

Typical Electrical and Thermal Characteristic Curves

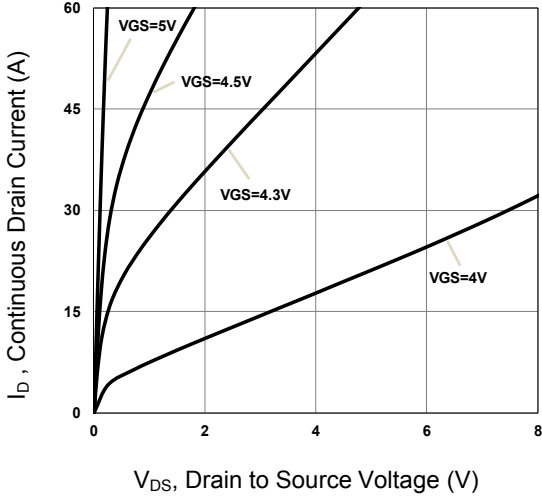


Fig.1 Typical Output Characteristics

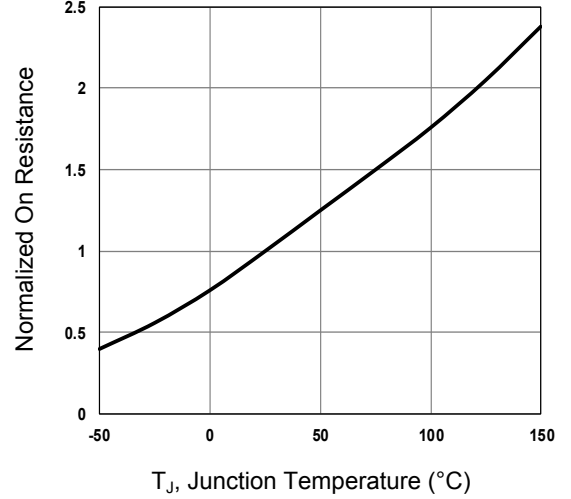


Fig.2 Normalized $R_{DS(ON)}$ vs. T_J

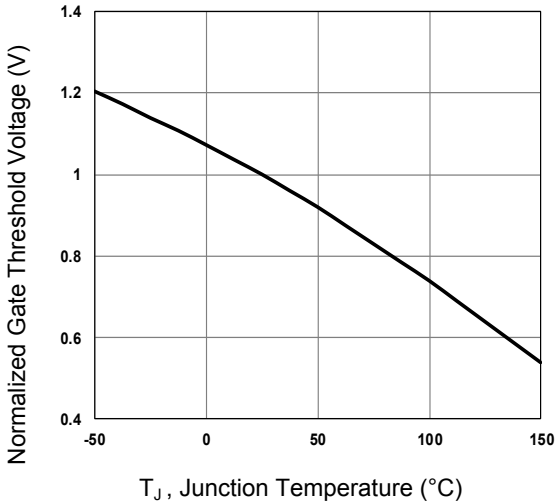


Fig.3 Normalized V_{th} vs. T_J

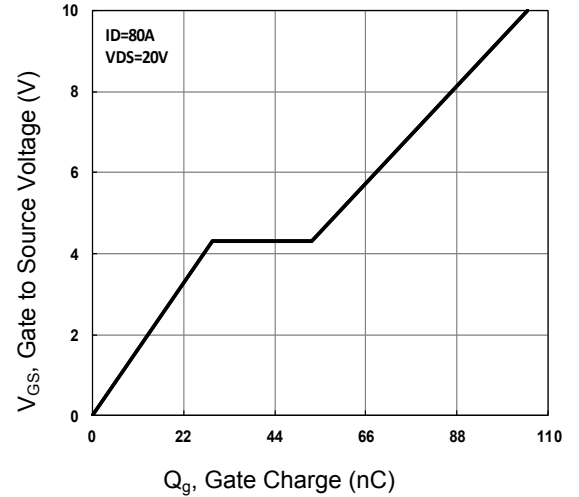


Fig.4 Gate Charge Waveform

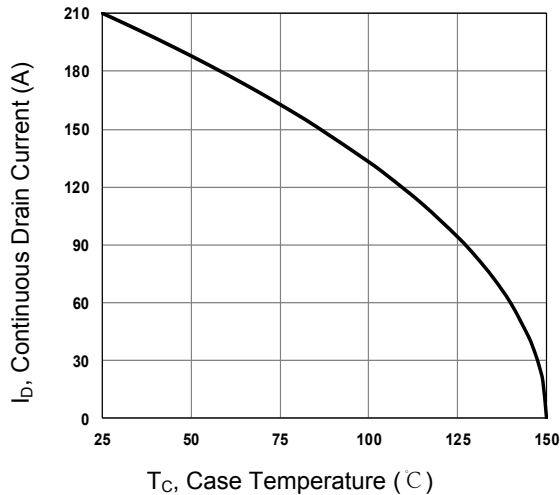


Fig.5 Continuous Drain Current vs. T_C

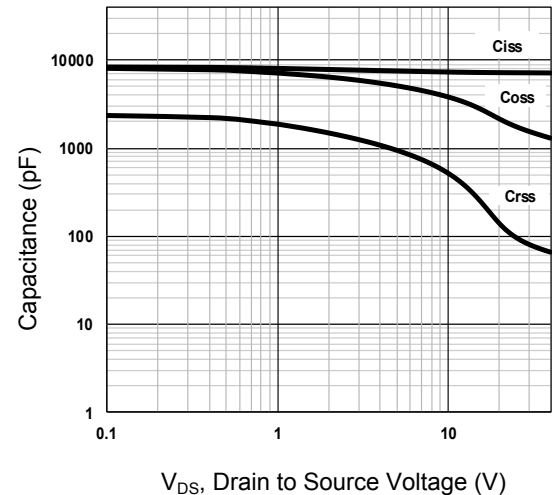


Fig.6 Capacitance Characteristics

Typical Electrical and Thermal Characteristic Curves

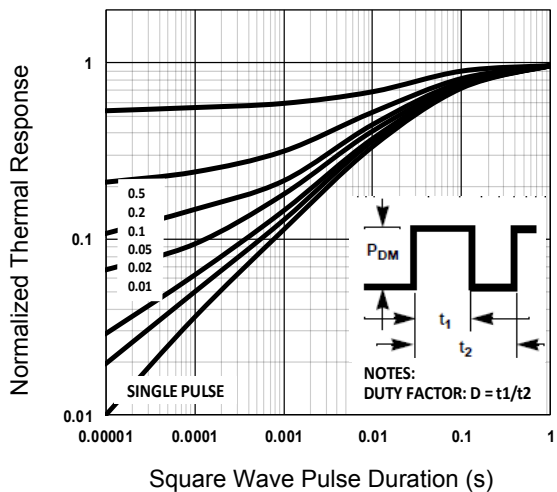


Fig.7 Normalized Transient Impedance

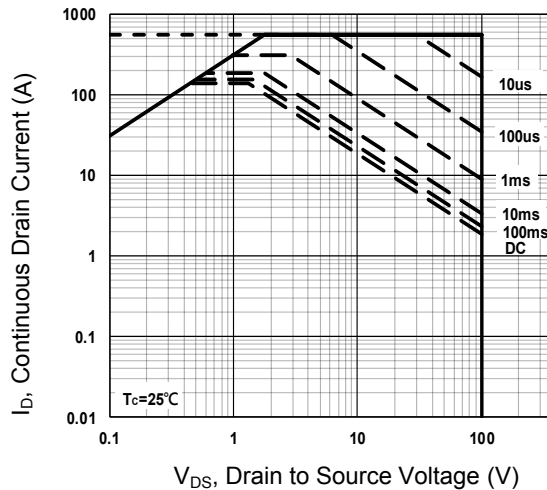


Fig.8 Maximum Safe Operation Area

Typical Electrical and Thermal Characteristic Curves

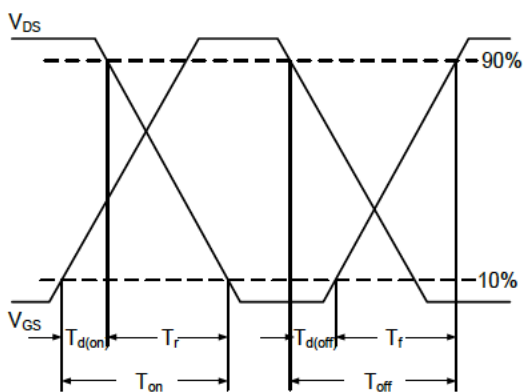


Fig.9 Switching Time Waveform

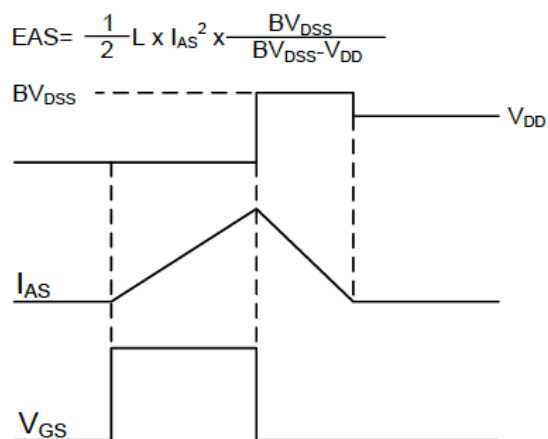
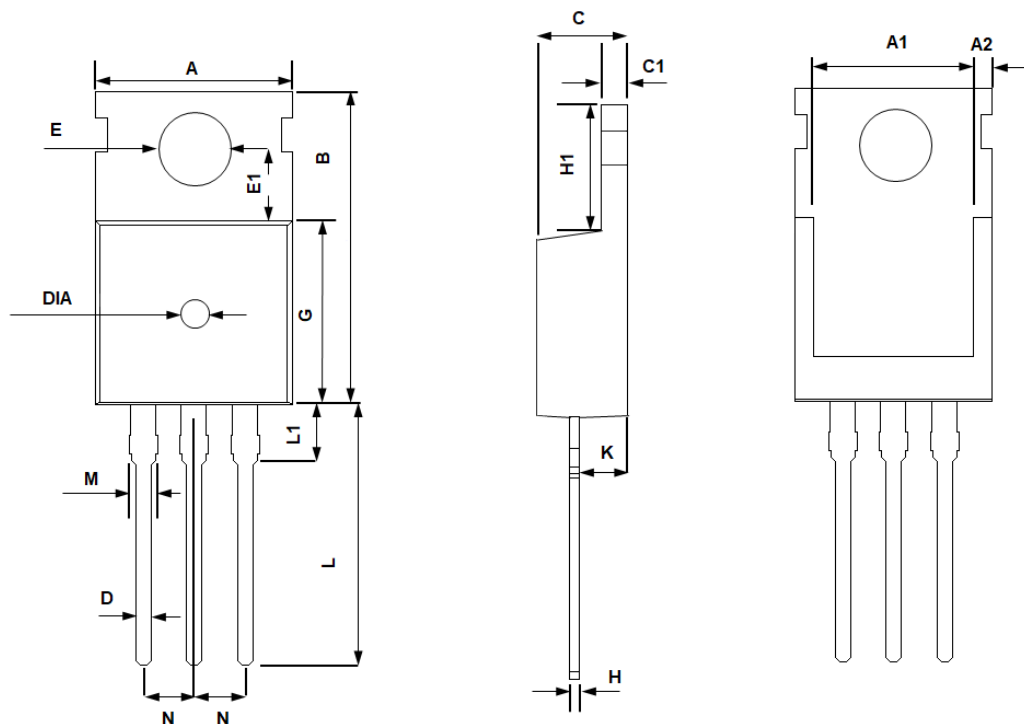


Fig.10 EAS Waveform

Package Outline Dimensions

TO220



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	10.300	9.700	0.406	0.382
A1	8.600	7.600	0.338	0.299
A2	1.250	0.800	0.049	0.031
B	16.20	14.50	0.638	0.570
C	4.750	4.280	0.187	0.169
C1	1.500	1.100	0.059	0.043
D	1.000	0.600	0.039	0.024
E	4.000	3.300	0.157	0.129
E1	3.800	3.400	0.149	0.133
G	9.300	8.400	0.366	0.343
H	0.600	0.200	0.024	0.016
H1	6.850	6.200	0.024	0.016
K	2.850	2.100	0.106	0.083
L	14.000	12.500	0.551	0.492
L1	3.850	3.000	0.152	0.118
M	1.500	1.100	0.059	0.043
N	2.600	2.450	0.102	0.096
DIA	Φ1.5 TYP.	deep0.2 TYP.	Φ0.059 TYP.	deep0.008 TYP.