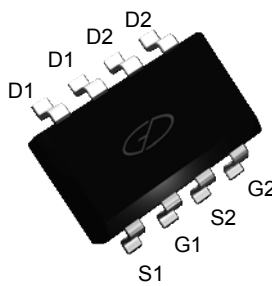
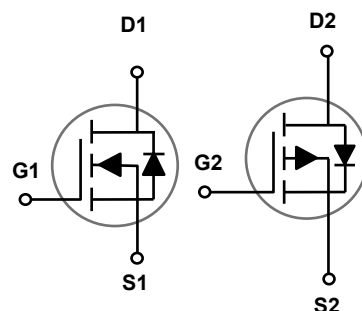


### Main Product Characteristics

Polarity	N-Ch	P-Ch
V <sub>DSS</sub>	40V	-40V
R <sub>DSon(max.)</sub>	32mΩ	40mΩ
I <sub>D</sub>	6.7A	-7.2A



SOP-8



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 GSFQ4701 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<sub>C</sub>=25°C unless otherwise specified)

Parameter	Symbol	Rating		Unit
Drain-Source Voltage	V <sub>DS</sub>	40	-40	V
Gate-Source Voltage	V <sub>GS</sub>	±20	±20	V
Drain Current – Continuous (T <sub>C</sub> =25°C)	I <sub>D</sub>	6.7	-7.2	A
Drain Current – Continuous (T <sub>C</sub> =100°C)		4.3	-4.5	A
Drain Current – Pulsed <sup>1</sup>	I <sub>DM</sub>	26.8	28.8	A
Power Dissipation (T <sub>C</sub> =25°C)	P <sub>D</sub>	2.5		W
Power Dissipation – Derate above 25°C		0.02		W/°C
Storage Temperature Range	T <sub>STG</sub>	-55 to +150		°C
Operating Junction Temperature Range	T <sub>J</sub>	-55 to +150		°C

### Thermal Characteristics

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance Junction to Case	R <sub>θJC</sub>	---	50	°C/W
Thermal Resistance Junction to Ambient	R <sub>θJA</sub>	---	62	°C/W

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	40	---	---	V
$BV_{DSS}$ Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to $25^\circ\text{C}$ , $I_D=1\text{mA}$	---	0.04	---	$V/^\circ\text{C}$
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=40V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	$\mu\text{A}$
		$V_{DS}=32V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	10	$\mu\text{A}$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA
<b>On Characteristics</b>						
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=5A$	---	24	32	$\text{m}\Omega$
		$V_{GS}=4.5V, I_D=3A$	---	32	45	$\text{m}\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1	1.8	2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		---	-3	---	$\text{mV}/^\circ\text{C}$
Forward Transconductance	$g_{fs}$	$V_{DS}=10V, I_D=3A$	---	3.6	---	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>2, 3</sup>	$Q_g$	$V_{DS}=20V, V_{GS}=4.5V, I_D=3A$	---	2.8	5.6	nC
Gate-Source Charge <sup>2, 3</sup>	$Q_{gs}$		---	0.5	1	
Gate-Drain Charge <sup>2, 3</sup>	$Q_{gd}$		---	1.5	3	
Turn-On Delay Time <sup>2, 3</sup>	$T_{d(on)}$	$V_{DD}=20V, V_{GS}=4.5V, R_G=25\Omega, I_D=1A$	---	3.2	6	nS
Rise Time <sup>2, 3</sup>	$T_r$		---	8.6	16	
Turn-Off Delay Time <sup>2, 3</sup>	$T_{d(off)}$		---	18	36	
Fall Time <sup>2, 3</sup>	$T_f$		---	6	12	
Input Capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V, F=1\text{MHz}$	---	420	800	pF
Output Capacitance	$C_{oss}$		---	65	120	
Reverse Transfer Capacitance	$C_{rss}$		---	40	80	
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	$I_S$	$V_G=V_D=0V$ , Force Current	---	---	6.7	A
Pulsed Source Current	$I_{SM}$		---	---	13.4	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1	V

Note:

1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed, pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .
3. Essentially independent of operating temperature.

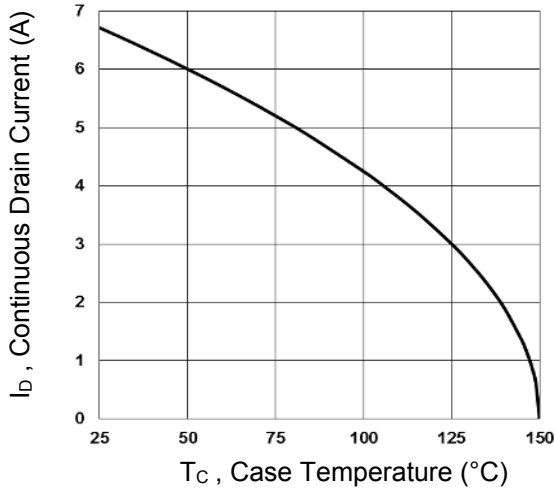
### P-Channel Electrical Characteristics ( $T_J=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-40	---	---	V
$BV_{DSS}$ Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to $25^\circ\text{C}$ , $I_D=-1\text{mA}$	---	-0.04	---	$V/^\circ\text{C}$
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=-40V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	-1	$\mu A$
		$V_{DS}=-32V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	-10	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 10V, V_{DS}=0V$	---	---	$\pm 100$	nA
<b>On Characteristics</b>						
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-4A$	---	32	40	$m\Omega$
		$V_{GS}=-4.5V, I_D=-2A$	---	45	60	$m\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1	-1.6	-2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		---	3	---	$mV/^\circ\text{C}$
Forward Transconductance	$g_{fs}$	$V_{DS}=-10V, I_D=-3A$	---	5	---	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>2, 3</sup>	$Q_g$	$V_{DS}=-20V, V_{GS}=-4.5V, I_D=-2A$	---	8	16	nC
Gate-Source Charge <sup>2, 3</sup>	$Q_{gs}$		---	2.1	4.2	
Gate-Drain Charge <sup>2, 3</sup>	$Q_{gd}$		---	3.6	7.2	
Turn-On Delay Time <sup>2, 3</sup>	$T_{d(on)}$	$V_{DD}=-20V, V_{GS}=-4.5V, R_G=25\Omega, I_D=-1A$	---	20	40	nS
Rise Time <sup>2, 3</sup>	$T_r$		---	12	24	
Turn-Off Delay Time <sup>2, 3</sup>	$T_{d(off)}$		---	46	80	
Fall Time <sup>2, 3</sup>	$T_f$		---	6	12	
Input Capacitance	$C_{iss}$	$V_{DS}=-15V, V_{GS}=0V, F=1\text{MHz}$	---	1050	1600	pF
Output Capacitance	$C_{oss}$		---	110	160	
Reverse Transfer Capacitance	$C_{rss}$		---	80	120	
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	$I_S$	$V_G=V_D=0V$ , Force Current	---	---	-7.2	A
Pulsed Source Current	$I_{SM}$		---	---	-14.4	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$	---	---	-1	V

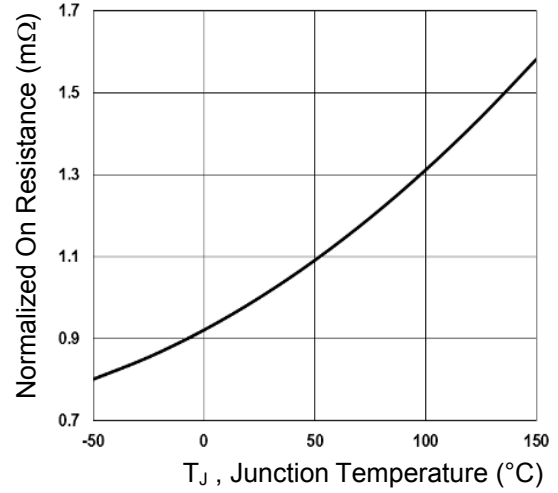
Note:

4. Repetitive Rating: Pulsed width limited by maximum junction temperature.
5. The data tested by pulsed, pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .
6. Essentially independent of operating temperature.

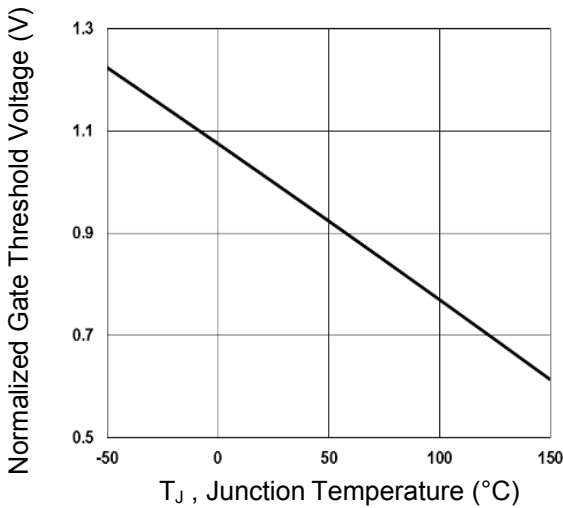
### N-Channel Typical Electrical and Thermal Characteristic Curves



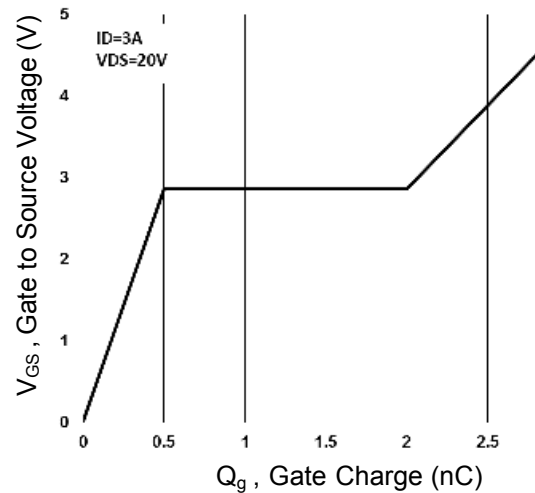
**Fig.1 Continuous Drain Current vs.  $T_C$**



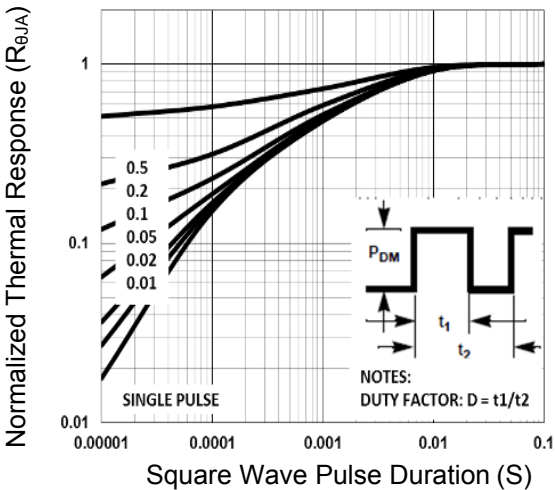
**Fig.2 Normalized  $R_{DS(ON)}$  vs.  $T_J$**



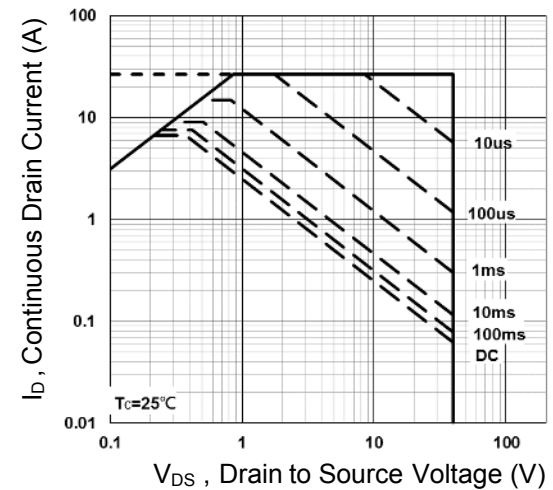
**Fig.3 Normalized  $V_{th}$  vs.  $T_J$**



**Fig.4 Gate Charge Waveform**

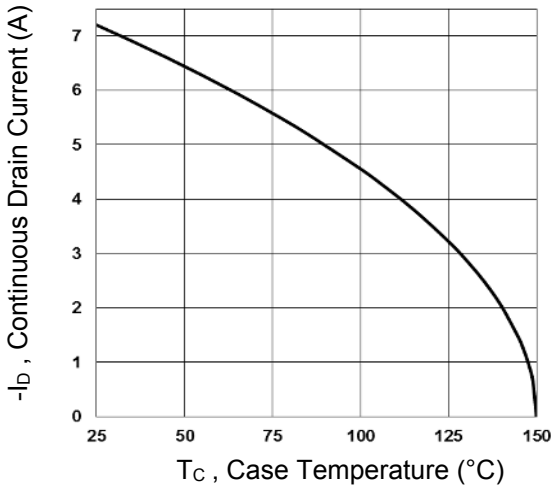


**Fig.5 Normalized Transient Impedance**

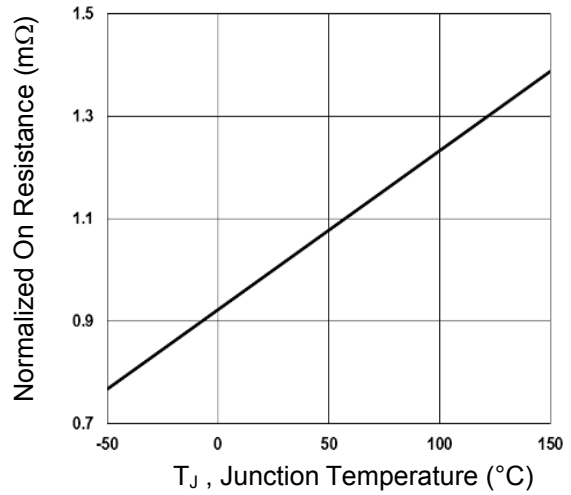


**Fig.6 Maximum Safe Operation Area**

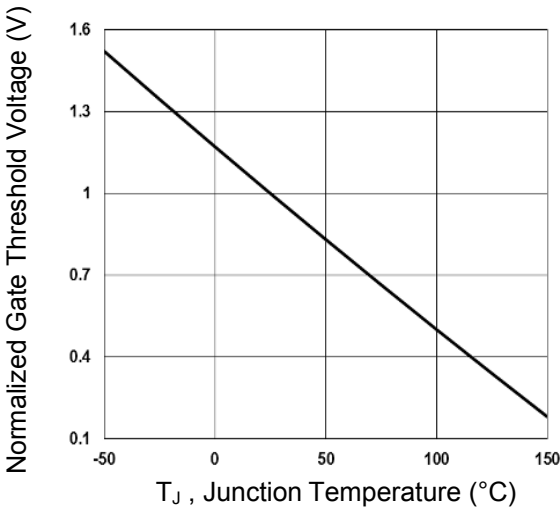
**P-Channel Typical Electrical and Thermal Characteristic Curves**



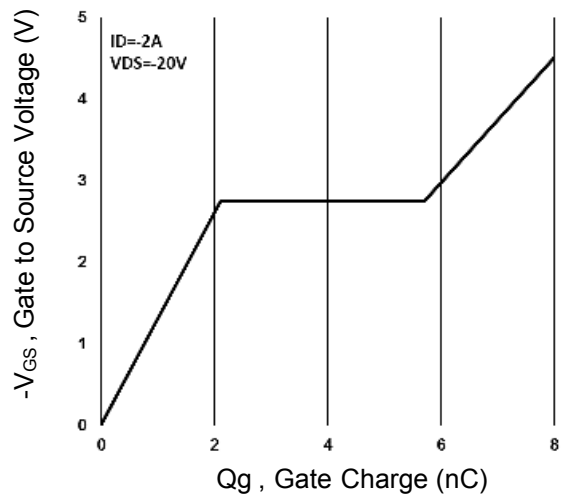
**Fig.7 Continuous Drain Current vs.  $T_c$**



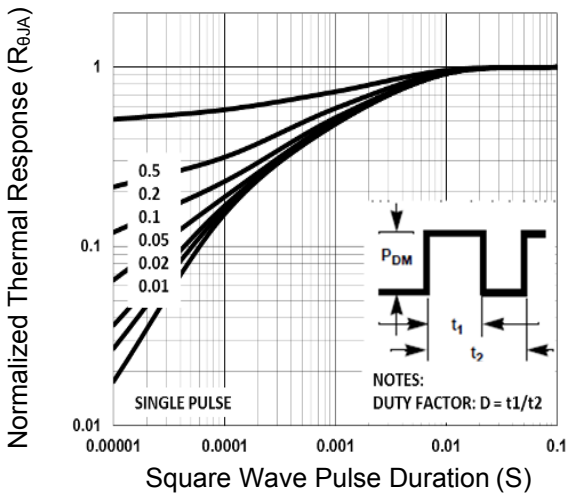
**Fig.8 Normalized  $R_{DS(ON)}$  vs.  $T_j$**



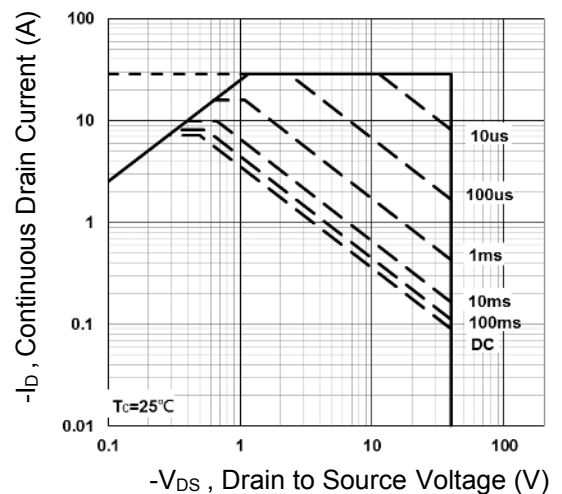
**Fig.9 Normalized  $V_{th}$  vs.  $T_j$**



**Fig.10 Gate Charge Waveform**



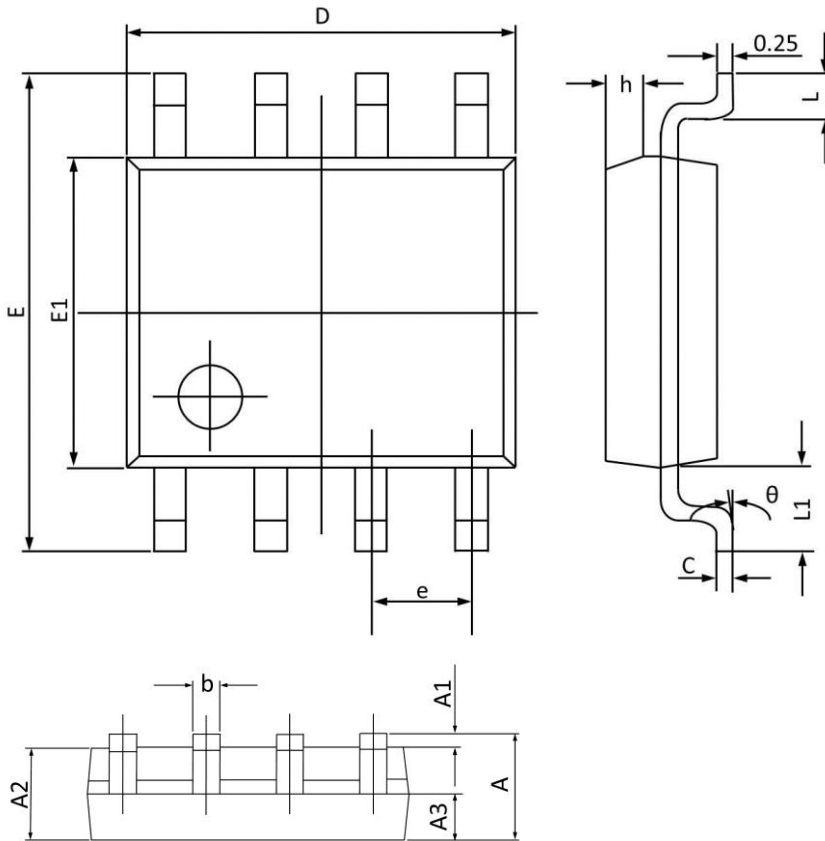
**Fig.11 Normalized Transient Impedance**



**Fig.12 Maximum Safe Operation Area**

**Package Outline Dimensions**

**SOP-8**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.068
A1	0.100	0.250	0.004	0.009
A2	1.300	1.500	0.052	0.059
A3	0.600	0.700	0.024	0.027
b	0.390	0.480	0.016	0.018
c	0.210	0.260	0.009	0.010
D	4.700	5.100	0.186	0.200
E	5.800	6.200	0.229	0.244
E1	3.700	4.100	0.146	0.161
e	1.270(BSC)		0.050(BSC)	
h	0.250	0.500	0.010	0.019
L	0.500	0.800	0.019	0.031
L1	1.050(BSC)		0.041(BSC)	
θ	0°	8°	0°	8°