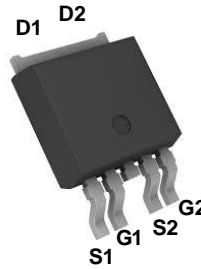
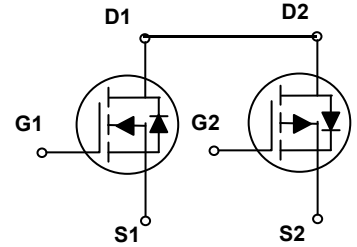


Main Product Characteristics

$V_{(BR)DSS}$	30V	-30V
$R_{DS(ON)}$	12m Ω	30m Ω
I_D	16A	-12A



TO-252-4L



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 GSFD03C16 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	Value		Unit
Drain-Source Voltage	V_{DS}	30	-30	V
Gate-Source Voltage	V_{GS}	± 20	± 20	V
Drain Current-Continuous ($T_C=25^\circ\text{C}$)	I_D	16	-12	A
Drain Current-Continuous ($T_C=100^\circ\text{C}$)		10.1	-7.6	A
Drain Current-Pulsed ¹	I_{DM}	64	-48	A
Power Dissipation ($T_C=25^\circ\text{C}$)	P_D	32.5		W
Power Dissipation-Derate Above 25°C		0.26		W/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.84		$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5		$^\circ\text{C}/\text{W}$
Storage Temperature Range	T_{STG}	-50 To +150		$^\circ\text{C}$
Operating Junction Temperature Range	T_J	-50 To +150		$^\circ\text{C}$

N-Channel 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}	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V, T_J=25^\circ\text{C}$	-	-	1	μA
		$V_{DS}=24V, V_{GS}=0V, T_J=125^\circ\text{C}$	-	-	10	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics						
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=10A$	-	9.4	12	m Ω
		$V_{GS}=4.5V, I_D=5A$	-	13	18	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	1.6	2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		-	-4.0	-	mV/ $^\circ\text{C}$
Forward Transconductance	g_{FS}	$V_{DS}=10V, I_D=3A$	-	6.0	-	S
Dynamic and Switching Characteristics						
Total Gate Charge ^{2,3}	Q_g	$V_{DS}=15V, I_D=5A, V_{GS}=4.5V$	-	7.4	12.0	nC
Gate-Source Charge ^{2,3}	Q_{gs}		-	2.3	5.0	
Gate-Drain Charge ^{2,3}	Q_{gd}		-	3.0	6.0	
Turn-On Delay Time ^{2,3}	$t_{d(on)}$	$V_{DD}=15V, R_G=6\Omega, V_{GS}=10V, I_D=1A$	-	3.8	7.0	nS
Rise Time ^{2,3}	t_r		-	10	19	
Turn-Off Delay Time ^{2,3}	$t_{d(off)}$		-	22.0	42	
Fall Time ^{2,3}	t_f		-	6.6	13.0	
Input Capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V, F=1\text{MHz}$	-	620	900	PF
Output Capacitance	C_{oss}		-	85	125	
Reverse Transfer Capacitance	C_{rss}		-	60	90	
Gate Resistance	R_g	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	-	2.8	5.6	Ω
Drain-Source Diode Characteristics and Maximum Ratings						
Continuous Source Current	I_S	$V_G=V_D=0V, \text{Force Current}$	-	-	16	A
Pulsed Source Current	I_{SM}		-	-	32	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. Pulse test: pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
3. Essentially independent of operating temperature.

N-Channel Typical Electrical and Thermal Characteristic Curves

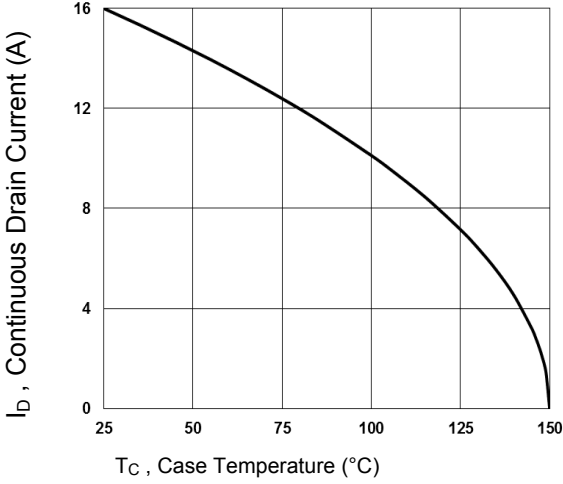


Fig.1 Continuous Drain Current vs. T_C

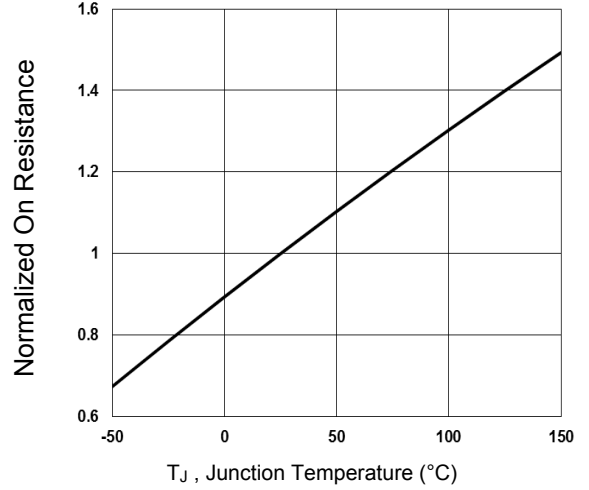


Fig.2 Normalized R_{DS(on)} vs. T_J

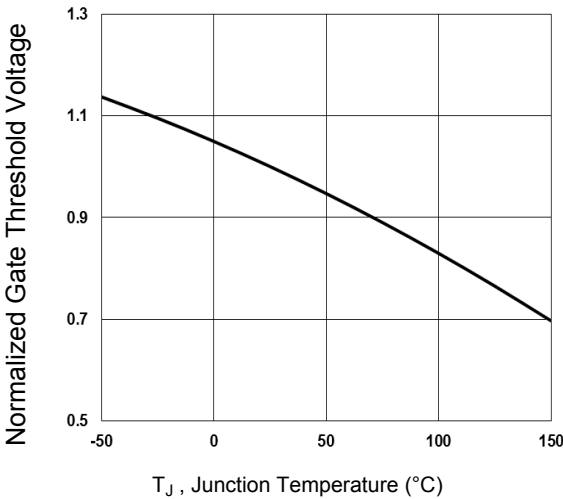


Fig.3 Normalized V_{th} vs. T_J

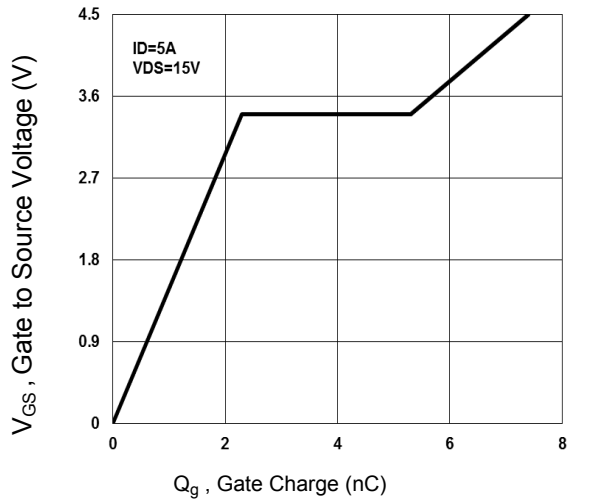


Fig.4 Gate Charge Waveform

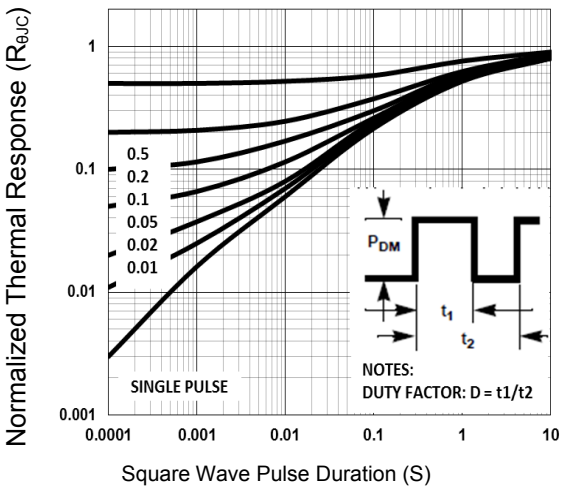


Fig.5 Normalized Transient Impedance

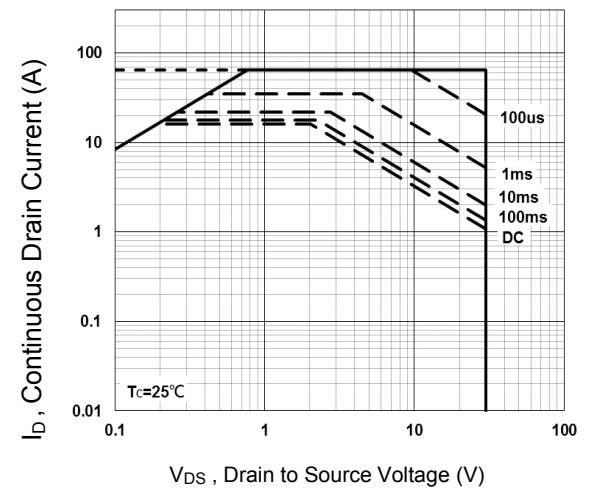
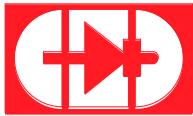


Fig.6 Maximum Safe Operation Area


P-Channel 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}	$V_{GS}=0V, I_D=-250\mu A$	-30	-	-	V
BV_{DSS} Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to 25°C , $I_D=-1mA$	-	-0.03	-	$V/^\circ\text{C}$
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=-30V, V_{GS}=0V,$ $T_J=25^\circ\text{C}$	-	-	-1	μA
		$V_{DS}=-24V, V_{GS}=0V,$ $T_J=125^\circ\text{C}$	-	-	-10	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics						
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-7A$	-	24	30	m Ω
		$V_{GS}=-4.5V, I_D=-4A$	-	37	46	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-1.6	-2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		-	4.0	-	$mV/^\circ\text{C}$
Forward Transconductance	g_{FS}	$V_{DS}=-10V, I_D=-3A$	-	9.0	-	S
Dynamic and Switching Characteristics						
Total Gate Charge ^{2,3}	Q_g	$V_{DS}=-15V, I_D=-5A,$ $V_{GS}=-4.5V$	-	8.0	15.0	nC
Gate-Source Charge ^{2,3}	Q_{gs}		-	3.3	6.0	
Gate-Drain Charge ^{2,3}	Q_{gd}		-	2.3	5.0	
Turn-On Delay Time ^{2,3}	$t_{d(on)}$	$V_{DD}=-15V, R_G=6\Omega$ $V_{GS}=-10V, I_D=-1A$	-	4.6	9	nS
Rise Time ^{2,3}	t_r		-	14	26	
Turn-Off Delay Time ^{2,3}	$t_{d(off)}$		-	34	58	
Fall Time ^{2,3}	t_f		-	18	35	
Input Capacitance	C_{iss}	$V_{DS}=-15V, V_{GS}=0V,$ $F=1MHz$	-	757	1280	PF
Output Capacitance	C_{oss}		-	122	210	
Reverse Transfer Capacitance	C_{rss}		-	88	175	
Drain-Source Diode Characteristics and Maximum Ratings						
Continuous Source Current	I_S	$V_G=V_D=0V,$ Force Current	-	-	-12	A
Pulsed Source Current	I_{SM}		-	-	-24	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 Typical Electrical and Thermal Characteristic Curves

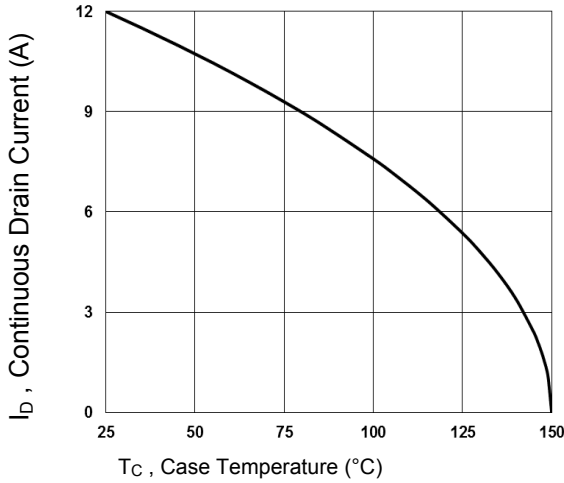


Fig.7 Continuous Drain Current vs. T_C

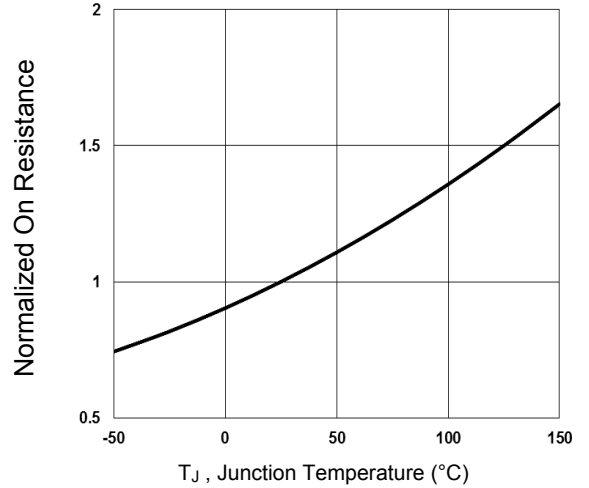


Fig.8 Normalized R_{DS(on)} vs. T_J

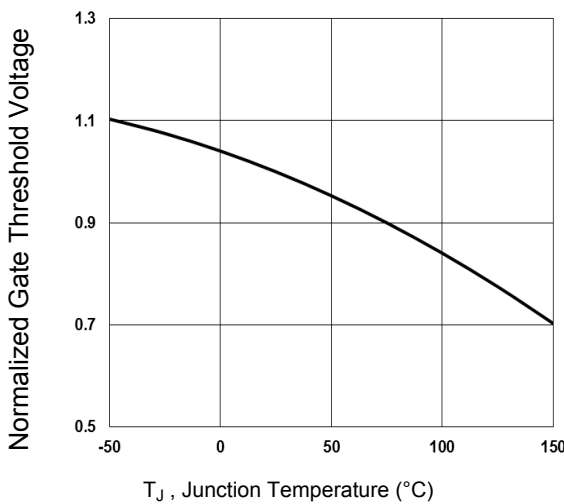


Fig.9 Normalized V_{th} vs. T_J

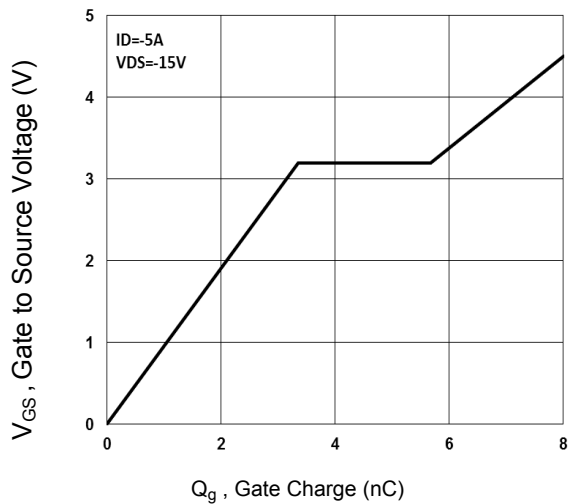


Fig.10 Gate Charge Waveform

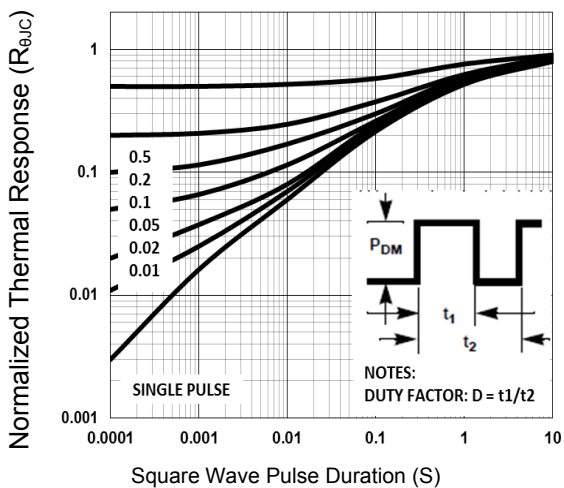


Fig.11 Normalized Transient Impedance

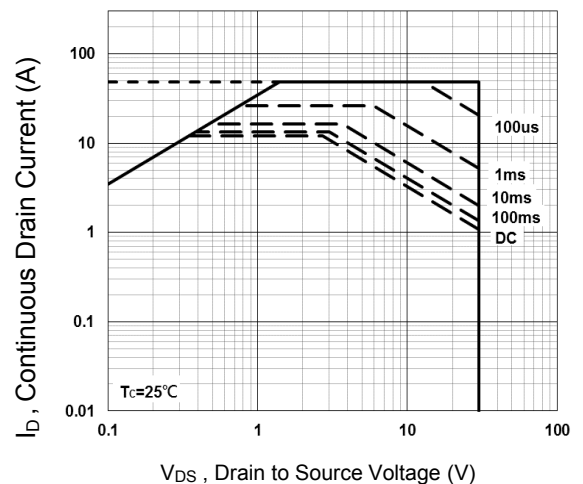
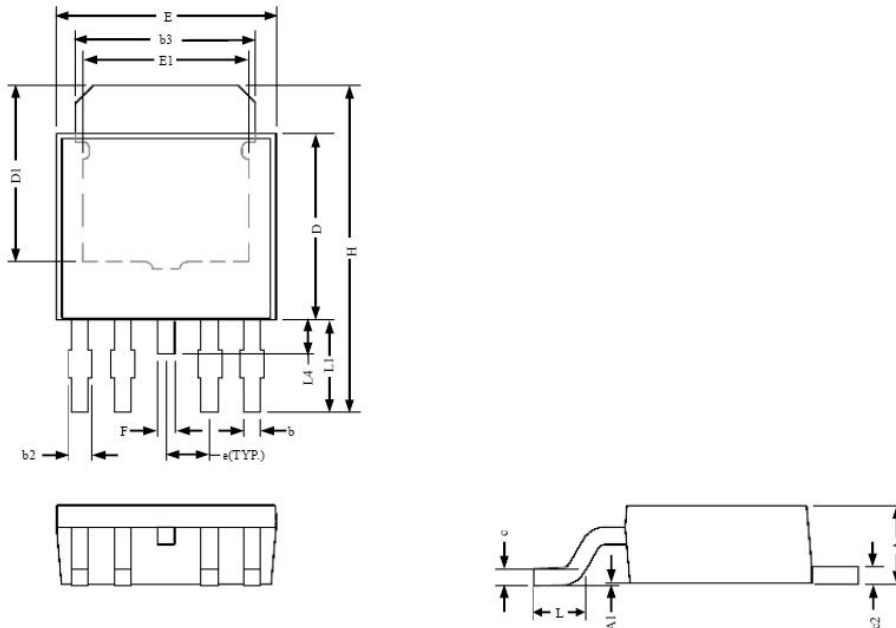


Fig.12 Maximum Safe Operation Area

Package Outline Dimensions TO-252-4L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	2.400	2.200	0.094	0.087
A1	0.150	0.000	0.006	0.000
B	0.600	0.400	0.024	0.016
b2	0.800	0.500	0.031	0.020
b3	5.500	5.200	0.217	0.205
C	0.508typ.		0.02typ.	
c2	0.550	0.450	0.022	0.018
D	5.800	5.400	0.228	0.213
D1	---	4.570	---	0.180
E	6.800	6.400	0.268	0.252
E1	---	3.810	---	0.150
E	1.27ref.		0.05ref.	
F	0.600	0.400	0.024	0.016
H	10.200	9.400	0.402	0.370
L	1.770	1.400	0.070	0.055
L1	3.000	2.400	0.118	0.094
L4	1.200	0.800	0.047	0.031