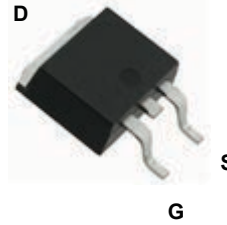
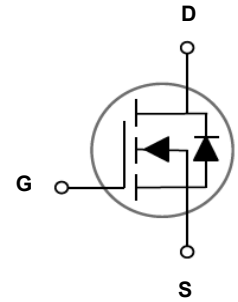


### Main Product Characteristics

$BV_{DSS}$	650V
$R_{DS(ON)}$	9Ω
$I_D$	2A



TO-252



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 GSFD6502 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 ( $T_C=25^{\circ}C$ unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	$V_{DS}$	650	V
Gate-Source Voltage	$V_{GS}$	±30	V
Drain Current-Continuous ( $T_C=25^{\circ}C$ )	$I_D$	2	A
Drain Current-Continuous ( $T_C=100^{\circ}C$ )		1.3	
Drain Current-Pulsed <sup>1</sup>	$I_{DM}$	8	A
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	9	mJ
Single Pulse Avalanche Current <sup>2</sup>	$I_{AS}$	2.5	A
Power Dissipation ( $T_C=25^{\circ}C$ )	$P_D$	32	W
Power Dissipation-Derate above 25°C		0.26	
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.9	°C/W
Operating Junction Temperature Range	$T_J$	-55 To +150	°C
Storage Temperature Range	$T_{STG}$	-55 To +150	°C

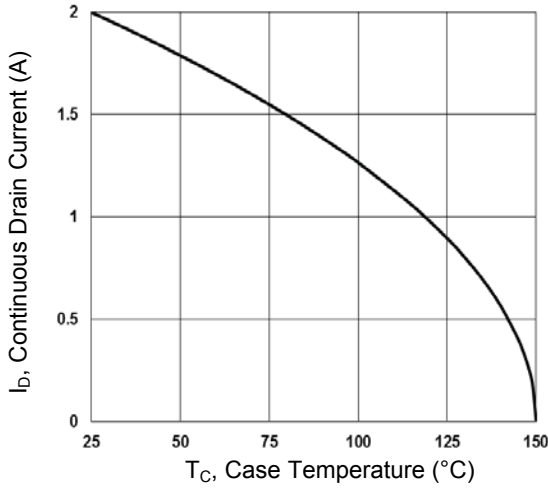
**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>On/Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	650	-	-	V
$BV_{DSS}$ Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to $25^{\circ}\text{C}$ , $I_D=1mA$	-	0.6	-	$V/^{\circ}\text{C}$
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=650V, V_{GS}=0V,$ $T_J=25^{\circ}\text{C}$	-	-	1	$\mu A$
		$V_{DS}=520V, V_{GS}=0V,$ $T_J=125^{\circ}\text{C}$	-	-	10	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 30V, V_{DS}=0V$	-	-	$\pm 100$	nA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=1A$	-	7.5	9	$\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	3	-	5	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		-	-7.2	-	$mV/^{\circ}\text{C}$
Forward Transconductance	$g_{fs}$	$V_{DS}=10V, I_D=1A$	-	1.6	-	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>3,4</sup>	$Q_g$	$V_{DS}=520V, I_D=2A,$ $V_{GS}=10V$	-	7.5	-	nC
Gate-Source Charge <sup>3,4</sup>	$Q_{gs}$		-	2.2	-	
Gate-Drain Charge <sup>3,4</sup>	$Q_{gd}$		-	2.3	-	
Turn-On Delay Time <sup>3,4</sup>	$t_{d(on)}$	$V_{DD}=300V, R_G=25\Omega,$ $V_{GS}=10V, I_D=2A$	-	5	-	nS
Rise Time <sup>3,4</sup>	$t_r$		-	16	-	
Turn-Off Delay Time <sup>3,4</sup>	$t_{d(off)}$		-	10	-	
Fall Time <sup>3,4</sup>	$t_f$		-	20	-	
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V,$ $F=1MHz$	-	230	-	pF
Output Capacitance	$C_{oss}$		-	22	-	
Reverse Transfer Capacitance	$C_{rss}$		-	4	-	
Gate Resistance	$R_g$	$V_{GS}=0V, V_{DS}=0V,$ $F=1MHz$	-	1.8	-	$\Omega$
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	$I_S$	$V_G=V_D=0V,$ Force Current	-	-	2	A
Pulsed Source Current	$I_{SM}$		-	-	8	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=1A,$ $T_J=25^{\circ}\text{C}$	-	-	1	V
Reverse Recovery Time <sup>3</sup>	$t_{rr}$	$V_{GS}=0V, I_S=1A,$ $di/dt=100A/\mu s,$ $T_J=25^{\circ}\text{C}$	-	-	-	nS
Reverse Recovery Charge <sup>3</sup>	$Q_{rr}$		-	-	-	$\mu C$

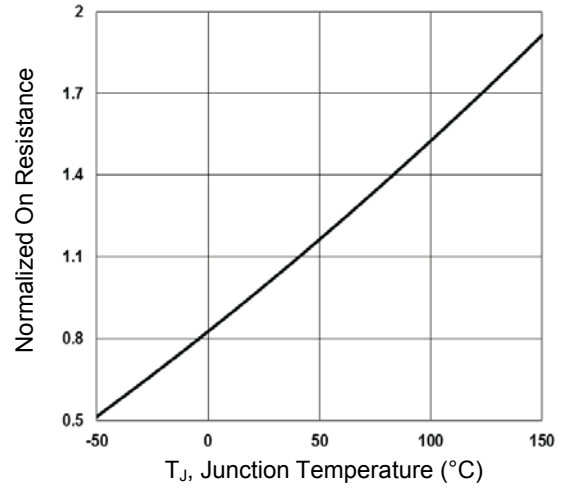
Note:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=50V, V_{GS}=10V, L=3mH, I_{AS}=2.5A, R_G=25\Omega$ , starting  $T_J=25^{\circ}\text{C}$ .
3. Pulse test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
4. Essentially independent of operation temperature.

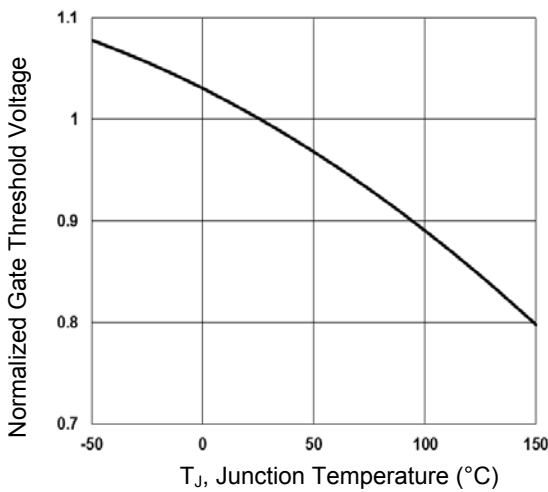
**Typical Electrical and Thermal Characteristic Curves**



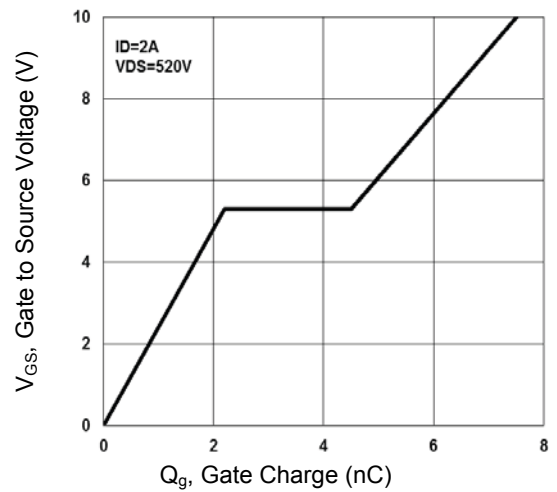
**Figure 1. Continuous Drain Current vs.  $T_C$**



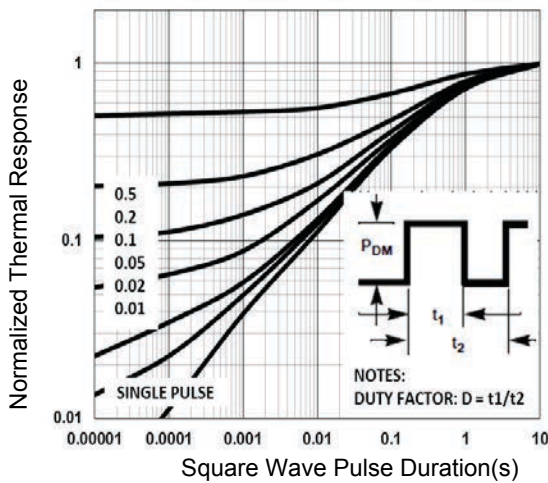
**Figure 2. Normalized  $R_{DSON}$  vs.  $T_J$**



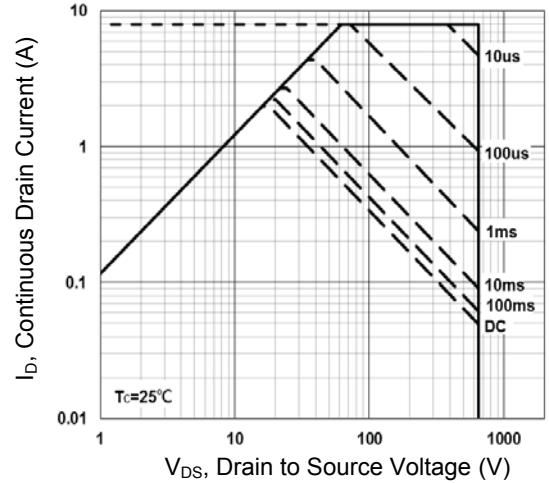
**Figure 3. Normalized  $V_{th}$  vs.  $T_J$**



**Figure 4. Gate Charge Waveform**

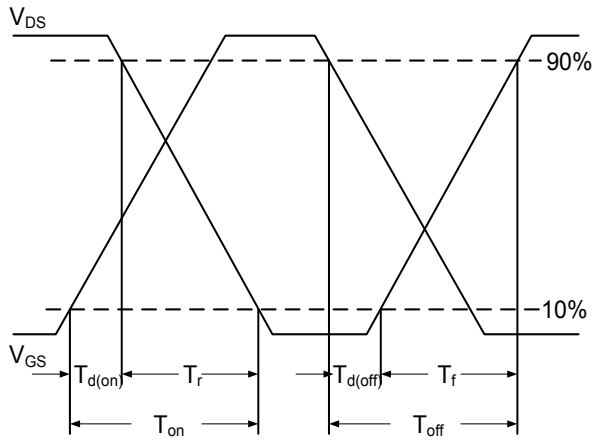


**Figure 5. Normalized Transient Impedance**

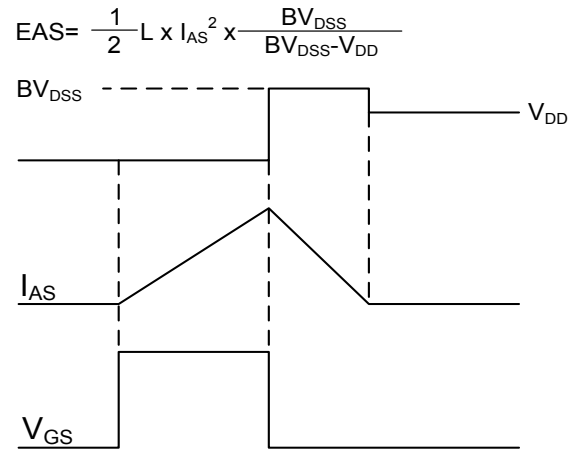


**Figure 6. Maximum Safe Operation Area**

**Typical Electrical and Thermal Characteristic Curves**

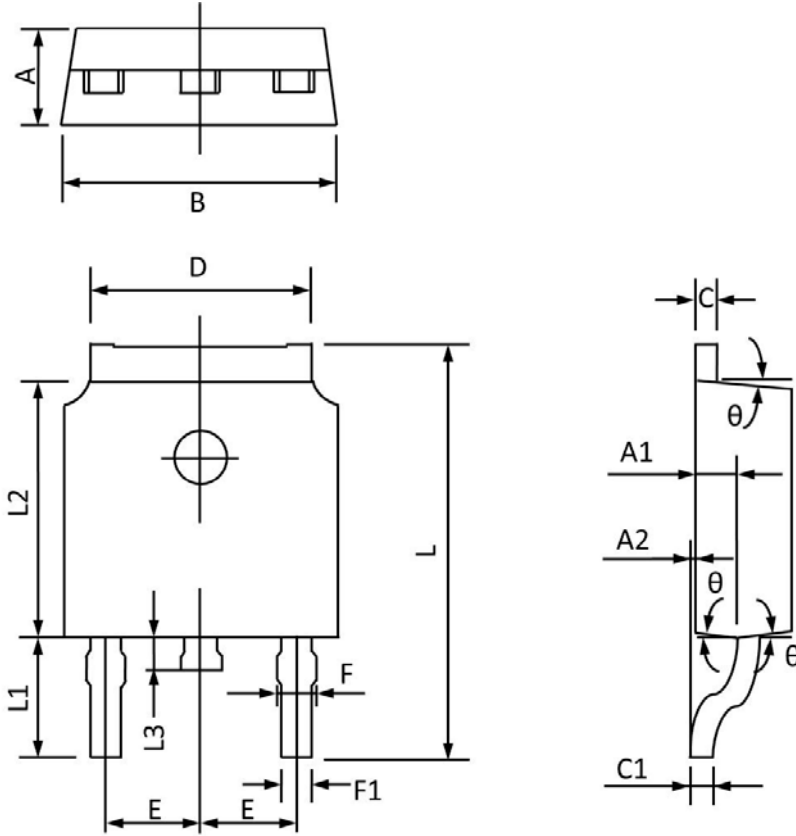


**Figure 7. Switching Time Waveform**



**Figure 8. EAS Waveform**

**Package Outline Dimensions (TO-252)**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	2.20	2.40	0.087	0.094
A1	0.91	1.11	0.036	0.044
A2	0.00	0.15	0.000	0.006
B	6.50	6.70	0.256	0.264
C	0.46	0.580	0.018	0.230
C1	0.46	0.580	0.018	0.030
D	5.10	5.46	0.201	0.215
E	2.186	2.386	0.086	0.094
F	0.74	0.94	0.029	0.037
F1	0.660	0.860	0.026	0.034
L	9.80	10.40	0.386	0.409
L1	2.9REF		0.114REF	
L2	6.00	6.20	0.236	0.244
L3	0.60	1.00	0.024	0.039
θ	3°	9°	3°	9°