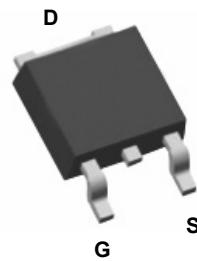
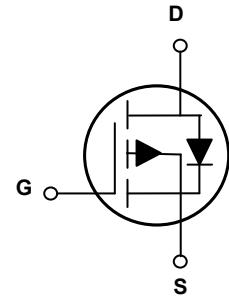


### Main Product Characteristics

$V_{DS}$	-40V
$R_{DS(ON)}$	14mΩ
$I_D$	-40A



TO-252 (DPAK)



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 GSFD0441 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	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	-40	A
Drain Current-Continuous( $T_C=100^\circ\text{C}$ )	$I_D(100^\circ\text{C})$	-28	A
Pulsed Drain Current	$I_{DM}$	-160	A
Maximum Power Dissipation( $T_C=25^\circ\text{C}$ )	$P_D$	80	W
Derating Factor		0.53	W/ $^\circ\text{C}$
Single Pulse Avalanche Energy <sup>5</sup>	$E_{AS}$	544	mJ
Thermal Resistance, Junction-to-Case <sup>2</sup>	$R_{\theta JC}$	1.88	$^\circ\text{C}/\text{W}$
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To +175	$^\circ\text{C}$

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design
5.  $E_{AS}$  condition:  $T_J=25^\circ\text{C}$ ,  $V_{DD}=-20\text{V}$ ,  $V_G=-10\text{V}$ ,  $L=1\text{mH}$ ,  $R_g=25\Omega$

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$\text{BV}_{\text{DSS}}$	$V_{\text{GS}}=0\text{V}$ $I_D=-250\mu\text{A}$	-40	-	-	V
Zero Gate Voltage Drain Current	$I_{\text{DSS}}$	$V_{\text{DS}}=-40\text{V}$ , $V_{\text{GS}}=0\text{V}$	-	-	-1	$\mu\text{A}$
Gate-Body Leakage Current	$I_{\text{GSS}}$	$V_{\text{GS}}=\pm20\text{V}$ , $V_{\text{DS}}=0\text{V}$	-	-	$\pm100$	nA
<b>On Characteristics<sup>3</sup></b>						
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}}=V_{\text{GS}}$ , $I_D=-250\mu\text{A}$	-1.5	-1.9	-2.5	V
Drain-Source On-State Resistance	$R_{\text{DS}(\text{ON})}$	$V_{\text{GS}}=-10\text{V}$ , $I_D=-12\text{A}$	-	12	14	$\text{m}\Omega$
		$V_{\text{GS}}=-4.5\text{V}$ , $I_D=-12\text{A}$	-	18.5	24	
Forward Transconductance	$g_{\text{FS}}$	$V_{\text{DS}}=-5\text{V}$ , $I_D=-12\text{A}$	-	34	-	S
<b>Dynamic Characteristics<sup>4</sup></b>						
Input Capacitance	$C_{\text{iss}}$	$V_{\text{DS}}=-20\text{V}$ , $V_{\text{GS}}=0\text{V}$ , $F=1.0\text{MHz}$	-	2960	-	PF
Output Capacitance	$C_{\text{oss}}$		-	370	-	PF
Reverse Transfer Capacitance	$C_{\text{rss}}$		-	310	-	PF
<b>Switching Characteristics<sup>4</sup></b>						
Turn-On Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{DD}}=-20\text{V}$ , $I_D=-12\text{A}$ , $V_{\text{GS}}=-10\text{V}$ , $R_G=3\Omega$	-	10	-	nS
Turn-On Rise Time	$t_r$		-	18	-	nS
Turn-Off Delay Time	$t_{\text{d}(\text{off})}$		-	38	-	nS
Turn-Off Fall Time	$t_f$		-	24	-	nS
Total Gate Charge	$Q_g$	$V_{\text{DS}}=-20\text{V}$ , $I_D=-12\text{A}$ , $V_{\text{GS}}=-10\text{V}$	-	72	-	nC
Gate-Source Charge	$Q_{\text{gs}}$		-	14	-	nC
Gate-Drain Charge	$Q_{\text{gd}}$		-	15	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage <sup>3</sup>	$V_{\text{SD}}$	$V_{\text{GS}}=0\text{V}$ , $I_s=-12\text{A}$	-	-	-1.2	V
Diode Forward Current <sup>2</sup>	$I_s$		-	-	-40	A
Reverse Recovery Time	$t_{\text{rr}}$	$T_J=25^\circ\text{C}$ , $I_F=-12\text{A}$ , $dI/dt=-100\text{A}/\mu\text{s}$ <sup>3</sup>	-	40	-	nS
Reverse Recovery Charge	$Q_{\text{rr}}$		-	42	-	nC
Forward Turn-On Time	$t_{\text{on}}$	Intrinsic turn-on time is negligible(turn-on is dominated by LS+LD)				

## Typical Electrical and Thermal Characteristic Curves

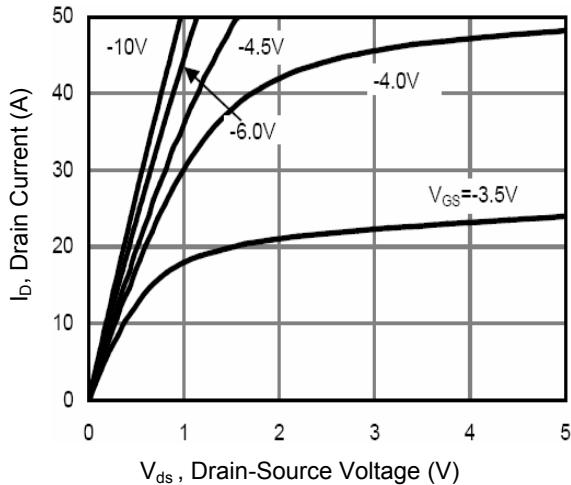


Figure 1. Output Characteristics

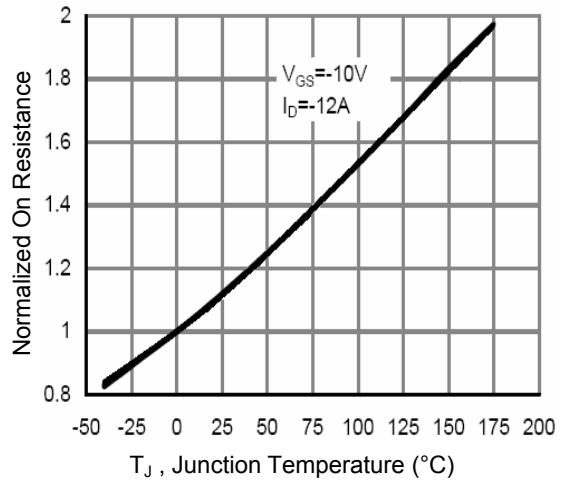


Figure 2.  $R_{DS(ON)}$ -Junction Temperature

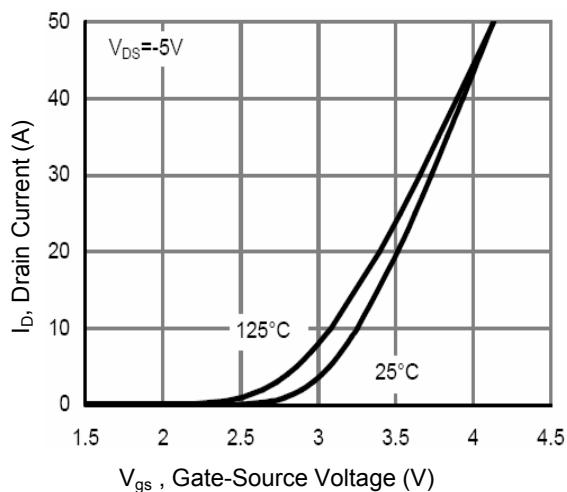


Figure 3. Transfer Characteristics

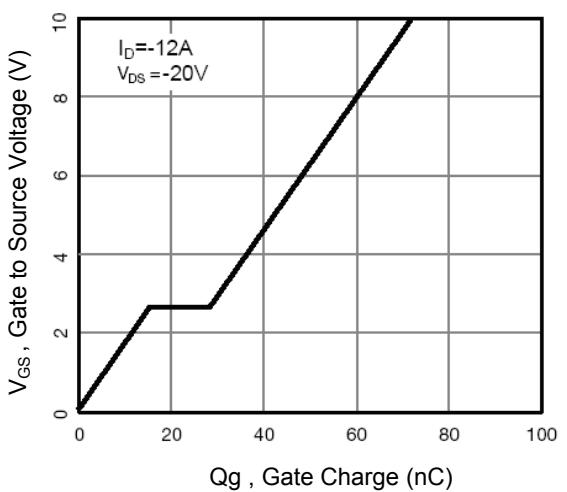


Figure 4. Gate Charge

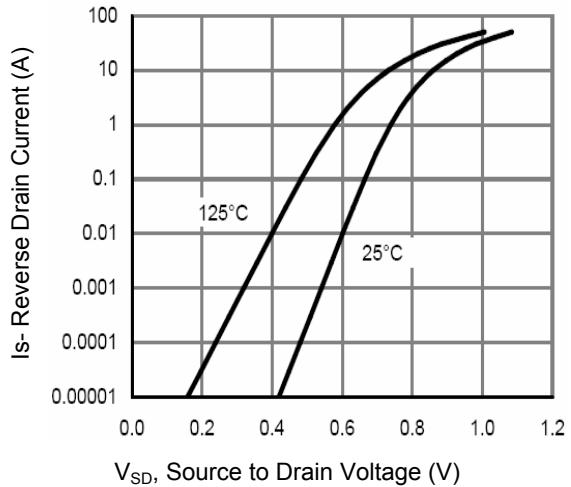


Figure 5. Source-Drain Diode Forward

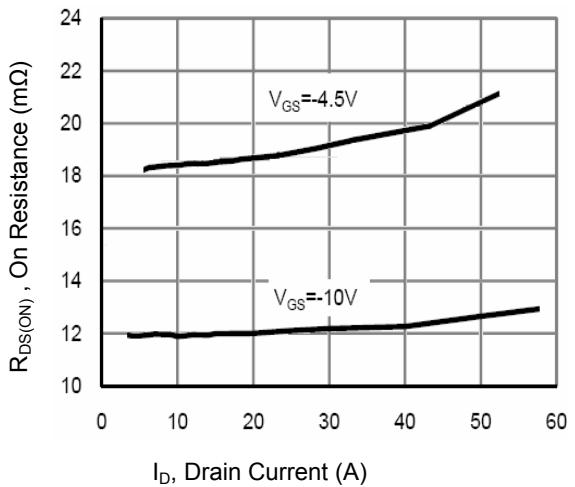


Figure 6.  $R_{ds(on)}$ -Drain Current

## Typical Electrical and Thermal Characteristic Curves

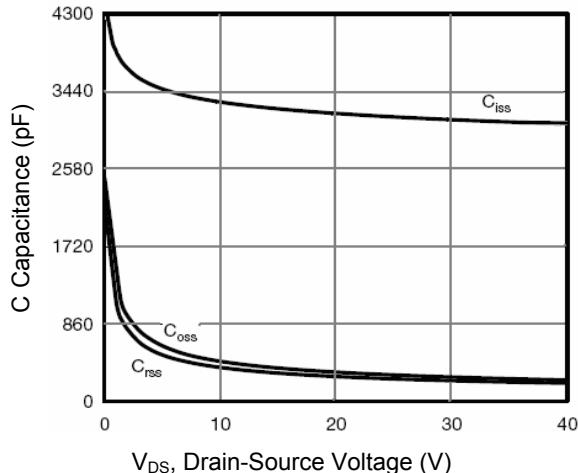


Figure 7. Capacitance vs.  $V_{DS}$

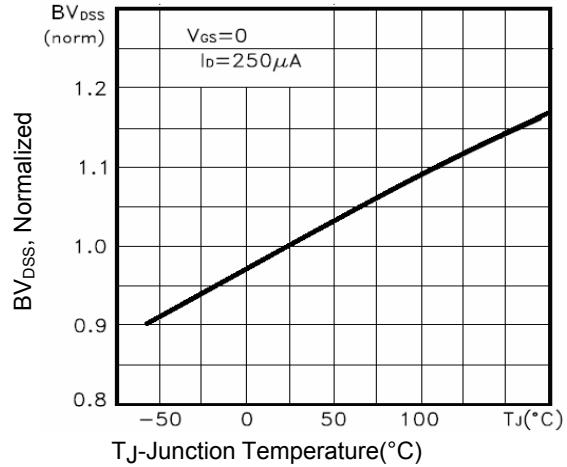


Figure 8.  $BV_{DSS}$  VS Junction Temperature

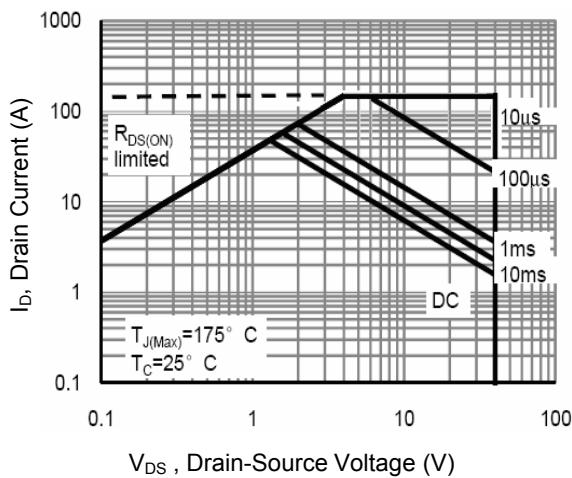


Figure 9. Safe Operation Area

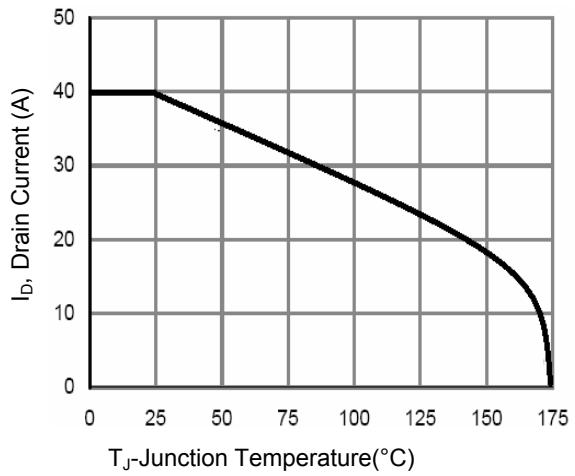


Figure 10.  $I_D$  Current Derating VS Junction Temperature

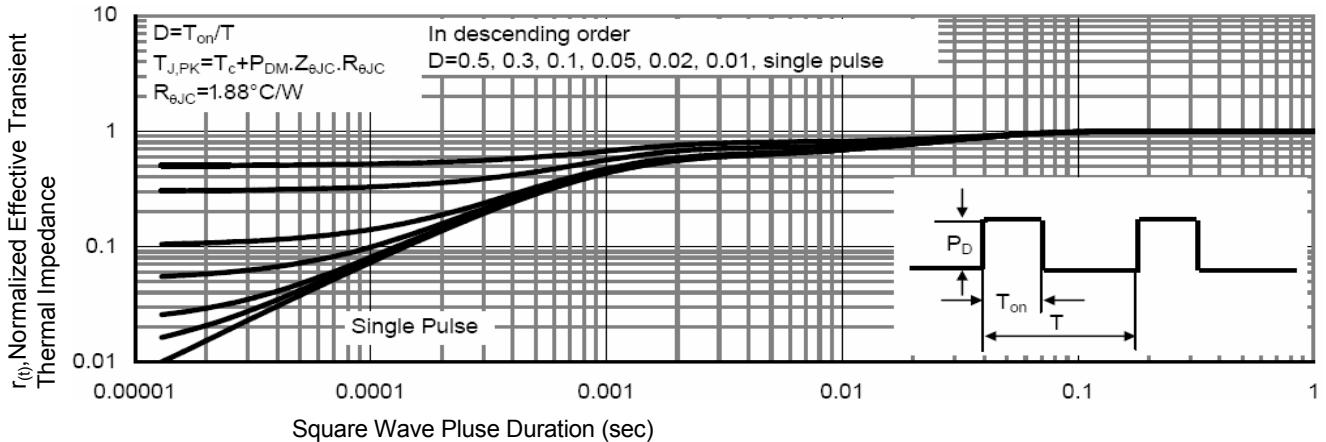


Figure 11. Normalized Maximum Transient Thermal Impedance

### Typical Electrical and Thermal Characteristic Curves

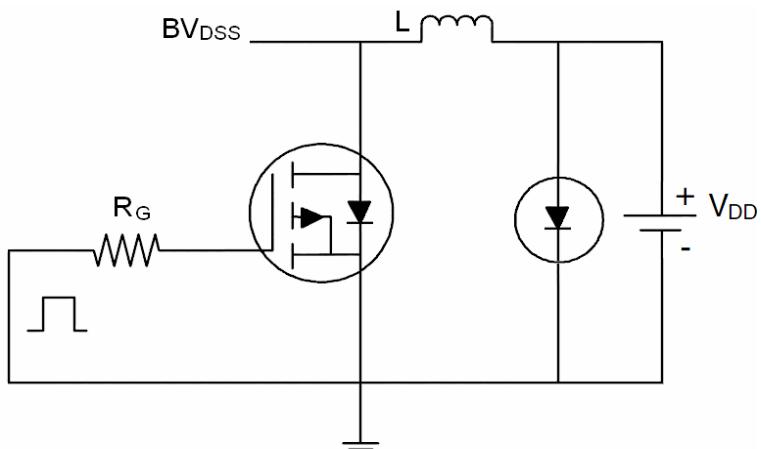


Figure 12. E<sub>AS</sub> Test Circuit

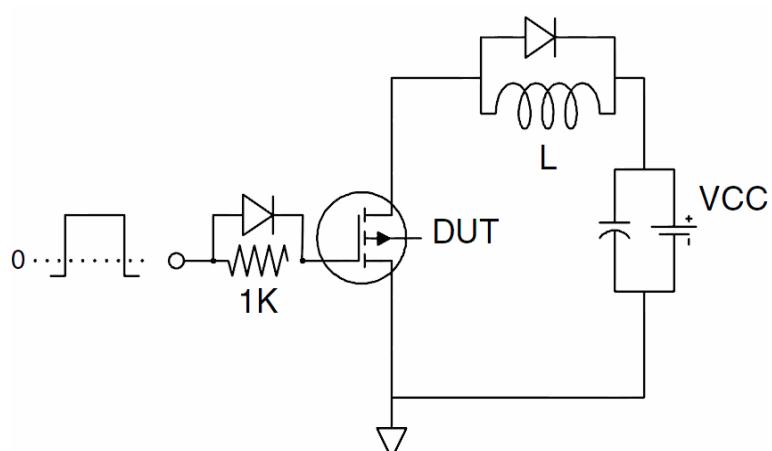


Figure 13. Gate Charge Test Circuit

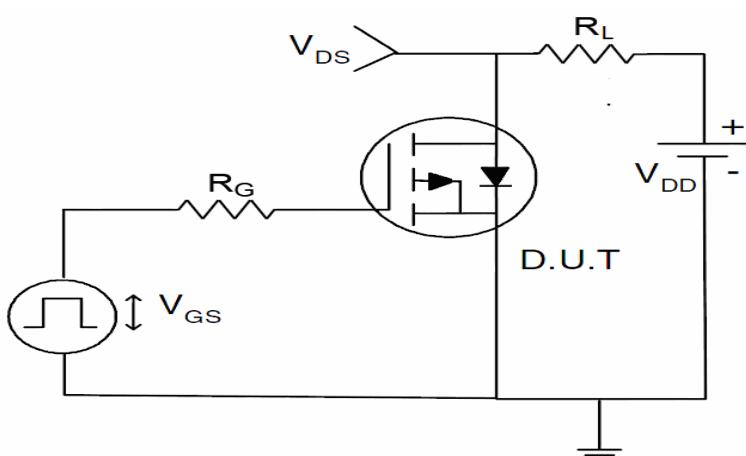
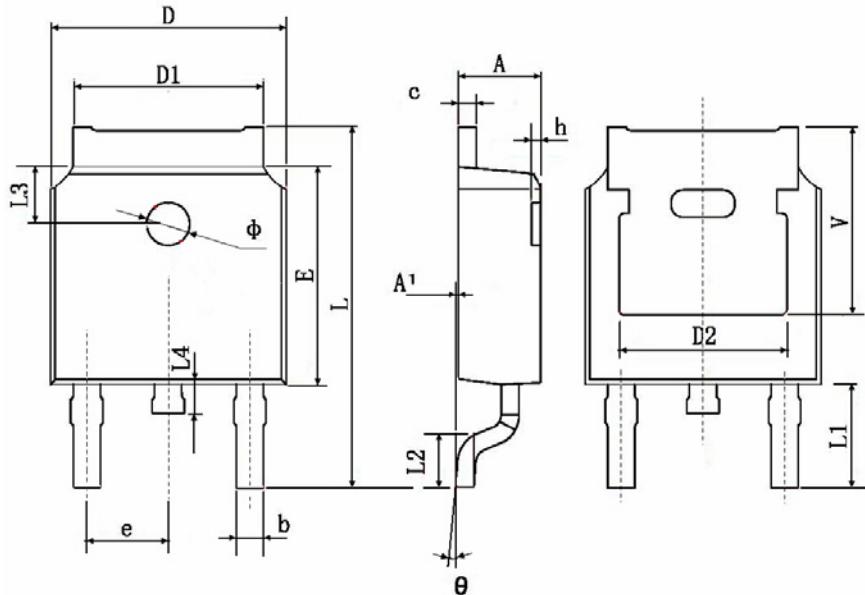


Figure 14. Switch Time Test Circuit

### Package Outline Dimensions (TO-252/DPAK)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	