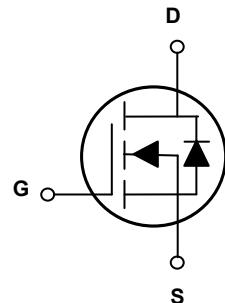
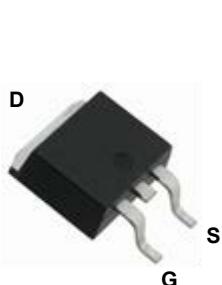


## Main Product Characteristics

$V_{(BR)DSS}$	100V
$R_{DS(ON)}$	9.2mΩ
$I_D$	60A



## Features and Benefits

TO-252

Schematic Diagram

- 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 SSFD0976 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	Rating	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	+20 / -12	V
Drain Current – Continuous ( $T_C=25^\circ C$ )	$I_D$	60	A
Drain Current – Continuous ( $T_C=100^\circ C$ )		38	A
Drain Current – Pulsed <sup>1</sup>	$I_{DM}$	240	A
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	211	mJ
Single Pulse Avalanche Current <sup>2</sup>	$I_{AS}$	65	A
Power Dissipation ( $T_C=25^\circ C$ )	$P_D$	94	W
Power Dissipation – Derate above $25^\circ C$		0.75	W/ $^\circ C$
Storage Temperature Range	$T_{STG}$	-50 to +150	$^\circ C$
Operating Junction Temperature Range	$T_J$	-50 to +150	$^\circ C$

## Thermal Characteristics

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	---	62	$^\circ C/W$
Thermal Resistance Junction to Case	$R_{\theta JC}$	---	1.33	$^\circ C/W$

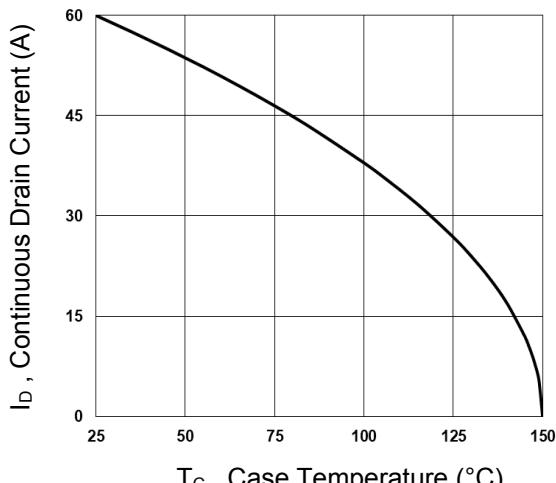
## Electrical Characteristics ( $T_J=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$\text{BV}_{\text{DSS}}$	$\text{V}_{\text{GS}}=0\text{V}, \text{I}_\text{D}=250\mu\text{A}$	100	---	---	V
$\text{BV}_{\text{DSS}}$ Temperature Coefficient	$\Delta \text{BV}_{\text{DSS}}/\Delta T_J$	Reference to $25^\circ\text{C}$ , $\text{I}_\text{D}=1\text{mA}$	---	0.054	---	$\text{V}/^\circ\text{C}$
Drain-Source Leakage Current	$\text{I}_{\text{DS}(\text{off})}$	$\text{V}_{\text{DS}}=100\text{V}, \text{V}_{\text{GS}}=0\text{V}, T_J=25^\circ\text{C}$	---	---	1	$\mu\text{A}$
		$\text{V}_{\text{DS}}=80\text{V}, \text{V}_{\text{GS}}=0\text{V}, T_J=125^\circ\text{C}$	---	---	10	$\mu\text{A}$
Gate-Source Leakage Current	$\text{I}_{\text{GS}(\text{off})}$	$\text{V}_{\text{GS}}=+20\text{V}, \text{V}_{\text{DS}}=0\text{V}$	---	---	100	$\text{nA}$
<b>On Characteristics</b>						
Static Drain-Source On-Resistance	$\text{R}_{\text{DS}(\text{ON})}$	$\text{V}_{\text{GS}}=10\text{V}, \text{I}_\text{D}=15\text{A}$	---	7.4	9.2	$\text{m}\Omega$
		$\text{V}_{\text{GS}}=4.5\text{V}, \text{I}_\text{D}=8\text{A}$	---	10.6	14	$\text{m}\Omega$
Gate Threshold Voltage	$\text{V}_{\text{GS}(\text{th})}$	$\text{V}_{\text{DS}}=\text{V}_{\text{GS}}, \text{I}_\text{D}=250\mu\text{A}$	1	1.6	2.5	V
$\text{V}_{\text{GS}(\text{th})}$ Temperature Coefficient	$\Delta \text{V}_{\text{GS}(\text{th})}$		---	-5.5	---	$\text{mV}/^\circ\text{C}$
Forward Transconductance	$\text{g}_{\text{fs}}$	$\text{V}_{\text{DS}}=10\text{V}, \text{I}_\text{D}=3\text{A}$	---	11	---	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>3, 4</sup>	$\text{Q}_\text{g}$	$\text{V}_{\text{DS}}=50\text{V}, \text{V}_{\text{GS}}=10\text{V}, \text{I}_\text{D}=8.5\text{A}$	---	37.8	76	nC
Gate-Source Charge <sup>3, 4</sup>	$\text{Q}_{\text{gs}}$		---	7.8	16	
Gate-Drain Charge <sup>3, 4</sup>	$\text{Q}_{\text{gd}}$		---	8.4	17	
Turn-On Delay Time <sup>3, 4</sup>	$\text{T}_{\text{d}(\text{on})}$	$\text{V}_{\text{DD}}=50\text{V}, \text{V}_{\text{GS}}=10\text{V}, \text{R}_\text{G}=6\Omega, \text{I}_\text{D}=1\text{A}$	---	14.6	30	nS
Rise Time <sup>3, 4</sup>	$\text{T}_\text{r}$		---	21.5	44	
Turn-Off Delay Time <sup>3, 4</sup>	$\text{T}_{\text{d}(\text{off})}$		---	54	108	
Fall Time <sup>3, 4</sup>	$\text{T}_\text{f}$		---	84.3	168	
Input Capacitance	$\text{C}_{\text{iss}}$	$\text{V}_{\text{DS}}=50\text{V}, \text{V}_{\text{GS}}=0\text{V}, \text{F}=1\text{MHz}$	---	2250	4500	pF
Output Capacitance	$\text{C}_{\text{oss}}$		---	410	820	
Reverse Transfer Capacitance	$\text{C}_{\text{rss}}$		---	25	50	
Gate Resistance	$\text{R}_\text{g}$	$\text{V}_{\text{GS}}=0\text{V}, \text{V}_{\text{DS}}=0\text{V}, \text{F}=1\text{MHz}$	---	1.43	---	$\Omega$
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	$\text{I}_\text{s}$	$\text{V}_{\text{G}}=\text{V}_{\text{D}}=0\text{V}$ , Force Current	---	---	60	A
Pulsed Source Current	$\text{I}_{\text{sm}}$		---	---	120	A
Diode Forward Voltage	$\text{V}_{\text{SD}}$	$\text{V}_{\text{GS}}=0\text{V}, \text{I}_\text{s}=1\text{A}, T_J=25^\circ\text{C}$	---	---	1	V
Reverse Recovery Time	$\text{t}_{\text{rr}}$	$\text{V}_{\text{GS}}=0\text{V}, \text{I}_\text{s}=15\text{A}, \text{di/dt}=100\text{A}/\mu\text{s}, T_J=25^\circ\text{C}$	---	42.4	---	nS
Reverse Recovery Charge	$\text{Q}_{\text{rr}}$		---	46.5	---	nC

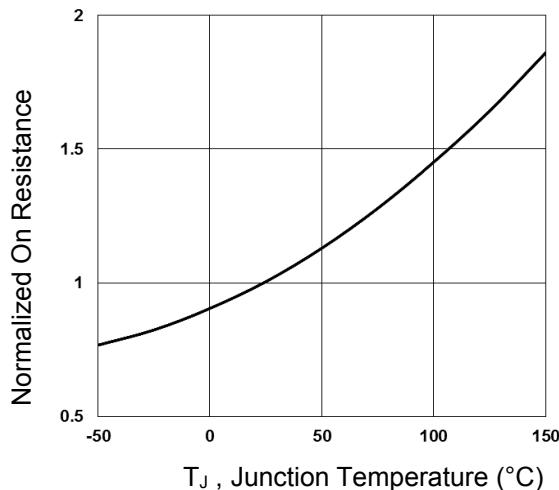
Note:

1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2.  $\text{V}_{\text{DD}}=50\text{V}, \text{V}_{\text{GS}}=10\text{V}, L=0.1\text{mH}, I_{\text{AS}}=65\text{A}, R_\text{G}=25\Omega$ , Starting  $T_J=25^\circ\text{C}$ .
3. The data tested by pulsed, pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.

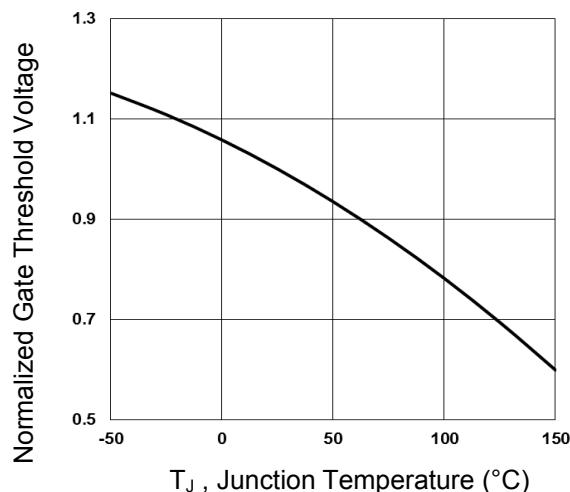
## Typical Electrical and Thermal Characteristic Curves



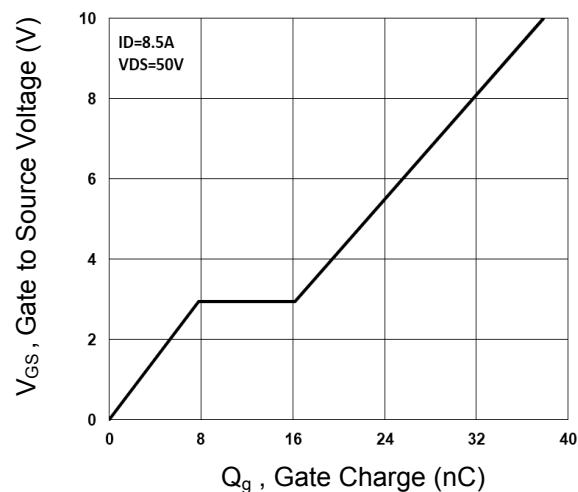
**Fig.1** Continuous Drain Current vs. T<sub>c</sub>



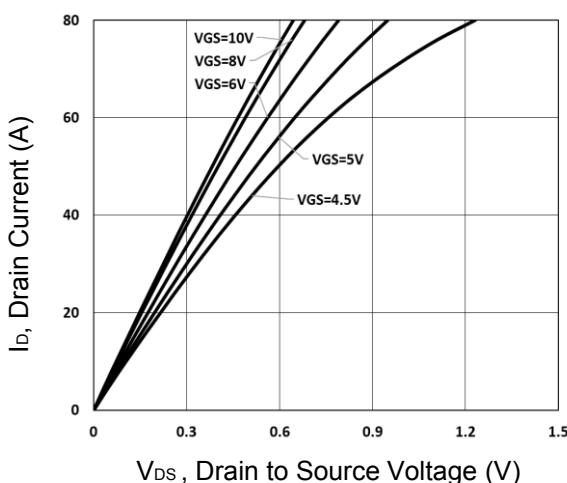
**Fig.2** Normalized R<sub>DS(ON)</sub> vs. T<sub>j</sub>



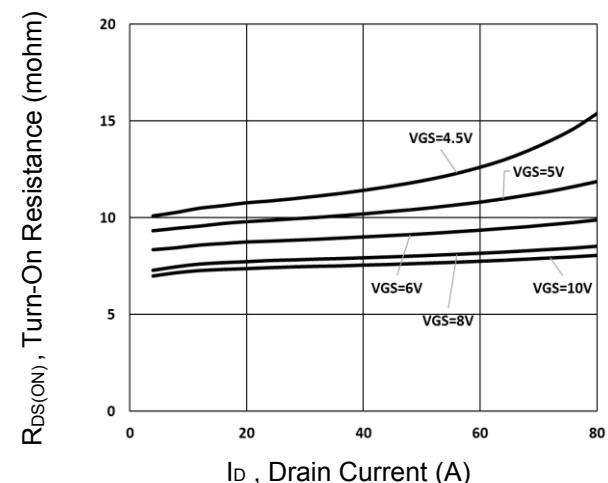
**Fig.3** Normalized V<sub>th</sub> vs. T<sub>j</sub>



**Fig.4** Gate Charge Characteristics

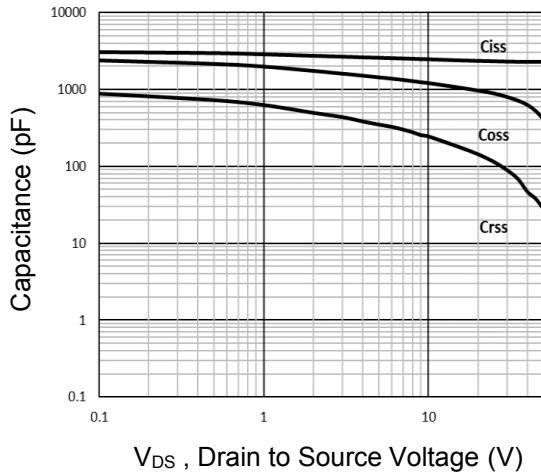


**Fig.5** Typical Output Characteristics



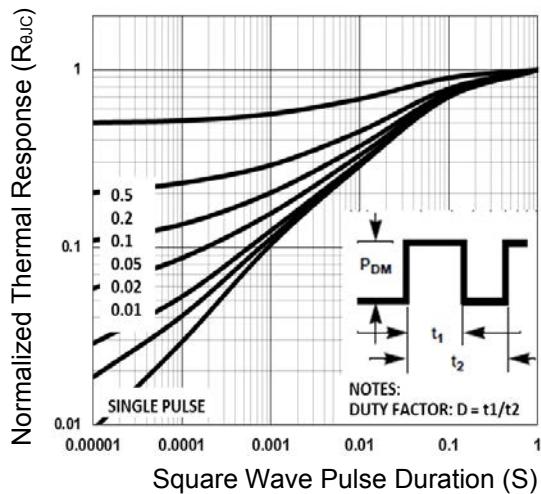
**Fig.6** Turn-On Resistance vs. I<sub>D</sub>

## Typical Electrical and Thermal Characteristic Curves



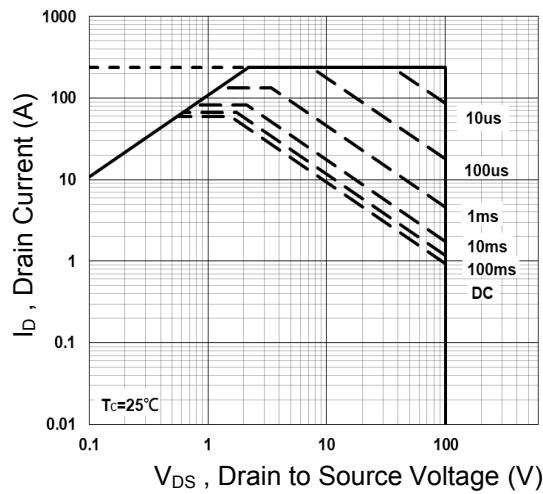
$V_{DS}$ , Drain to Source Voltage (V)

**Fig.7 Capacitance Characteristics**



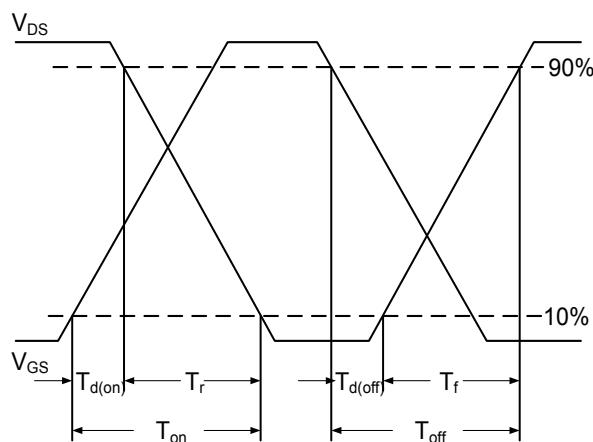
Square Wave Pulse Duration (S)

**Fig.8 Normalized Transient Impedance**

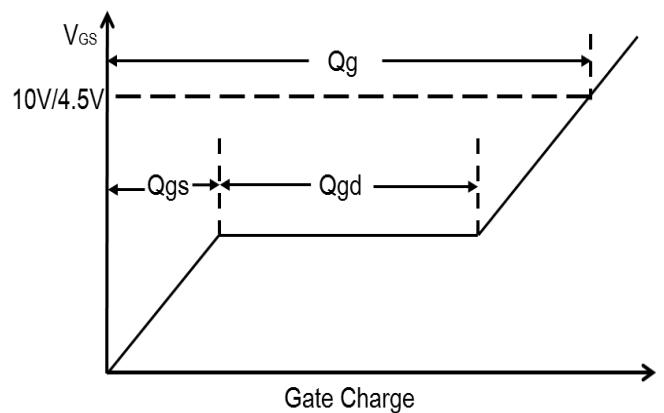


$V_{DS}$ , Drain to Source Voltage (V)

**Fig.9 Maximum Safe Operation Area**



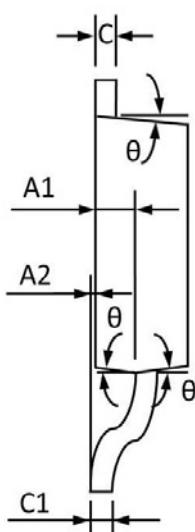
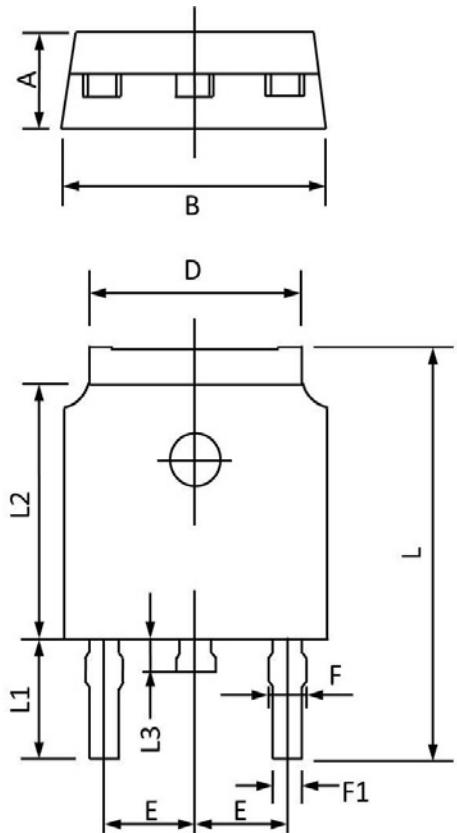
**Fig.10 Switching Time Waveform**



**Fig.11 Gate Charge Waveform**

**Package Outline Dimensions**

**TO-252 (DPAK)**



<b>Symbol</b>	<b>Dimensions In Millimeters</b>		<b>Dimensions In Inches</b>	
	<b>MAX</b>	<b>MIN</b>	<b>MAX</b>	<b>MIN</b>
A	2.400	2.200	0.094	0.087
A1	1.110	0.910	0.044	0.036
A2	0.150	0.000	0.006	0.000
B	6.800	6.400	0.268	0.252
C	0.580	0.450	0.023	0.018
C1	0.580	0.460	0.023	0.018
D	5.500	5.100	0.217	0.201
E	2.386	2.186	0.094	0.086
F	0.940	0.600	0.037	0.024
F1	0.860	0.500	0.034	0.020
L	10.400	9.400	0.409	0.370
L1	3.000	2.400	0.118	0.094
L2	6.200	5.400	0.244	0.213
L3	1.200	0.600	0.047	0.024
θ	9°	3°	9°	3°