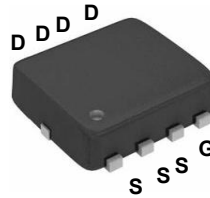
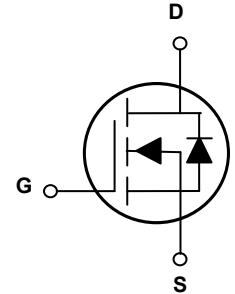


### Main Product Characteristics

$V_{(BR)DSS}$	30V
$R_{DS(ON)}$	4.5mΩ
$I_D$	64A



PPAK3X3



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 SSFN3964 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	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	±20	V
Drain Current – Continuous ( $T_C=25^{\circ}C$ )	$I_D$	64	A
Drain Current – Continuous ( $T_C=100^{\circ}C$ )		40	A
Drain Current – Pulsed <sup>1</sup>	$I_{DM}$	256	A
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	115	mJ
Single Pulse Avalanche Current <sup>2</sup>	$I_{AS}$	48	A
Power Dissipation ( $T_C=25^{\circ}C$ )	$P_D$	44.6	W
Power Dissipation – Derate above 25°C		0.36	W/°C
Storage Temperature Range	$T_{STG}$	-50 to +150	°C
Operating Junction Temperature Range	$T_J$	-50 to +150	°C

### Thermal Characteristics

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	---	62	°C/W
Thermal Resistance Junction to Case	$R_{\theta JC}$	---	2.8	°C/W

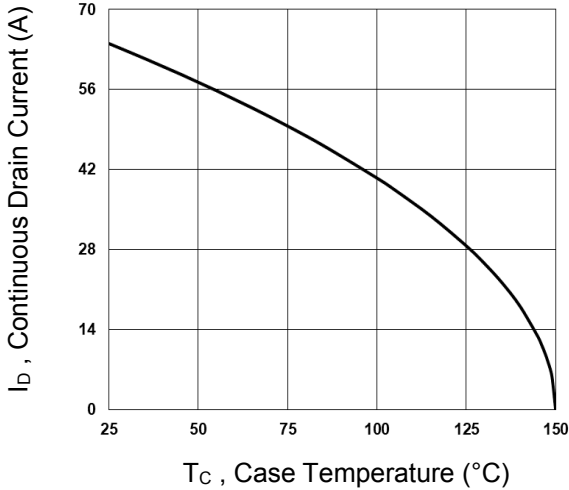
**Electrical Characteristics** ( $T_J=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	30	---	---	V
$BV_{DSS}$ Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to $25^\circ\text{C}$ , $I_D=1\text{mA}$	---	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	$\mu A$
		$V_{DS}=24V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	10	$\mu A$
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	$R_{DS(ON)}$	$V_{GS}=10V, I_D=15A$	---	3.6	4.5	m $\Omega$
		$V_{GS}=4.5V, I_D=10A$	---	4.9	6.4	m $\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.0	1.6	2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		---	-4.17	---	mV/ $^\circ\text{C}$
Forward Transconductance	$g_{fs}$	$V_{DS}=10V, I_D=3A$	---	10	---	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>3, 4</sup>	$Q_g$	$V_{DS}=15V, V_{GS}=10V, I_D=15A$	---	34.6	70	nC
Gate-Source Charge <sup>3, 4</sup>	$Q_{gs}$		---	5.5	11	
Gate-Drain Charge <sup>3, 4</sup>	$Q_{gd}$		---	6.8	13	
Turn-On Delay Time <sup>3, 4</sup>	$T_{d(on)}$	$V_{DD}=15V, V_{GS}=10V, R_G=3.3\Omega, I_D=1A$	---	9.7	20	nS
Rise Time <sup>3, 4</sup>	$T_r$		---	15.8	31	
Turn-Off Delay Time <sup>3, 4</sup>	$T_{d(off)}$		---	37.4	75	
Fall Time <sup>3, 4</sup>	$T_f$		---	12	24	
Input Capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V, F=1\text{MHz}$	---	1910	3800	pF
Output Capacitance	$C_{oss}$		---	300	600	
Reverse Transfer Capacitance	$C_{rss}$		---	230	460	
Gate Resistance	$R_g$	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	---	1.14	---	$\Omega$
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	$I_S$	$V_G=V_D=0V, \text{Force Current}$	---	---	64	A
Pulsed Source Current	$I_{SM}$		---	---	128	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1	V

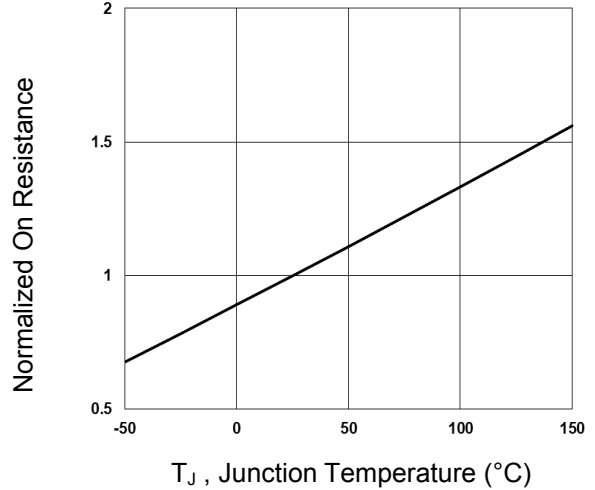
Note:

1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=48A, R_G=25\Omega, \text{Starting } T_J=25^\circ\text{C}$ .
3. The data tested by pulsed, pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.

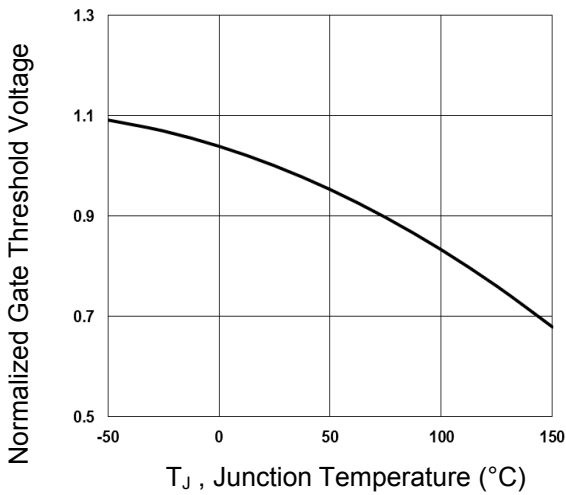
**Typical Electrical and Thermal Characteristic Curves**



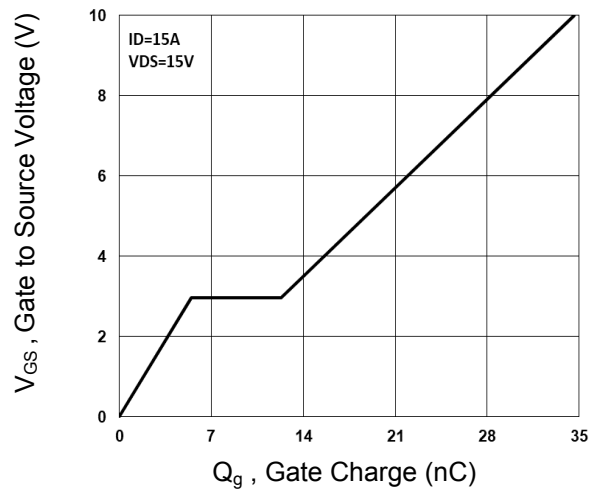
**Fig.1 Continuous Drain Current vs.  $T_C$**



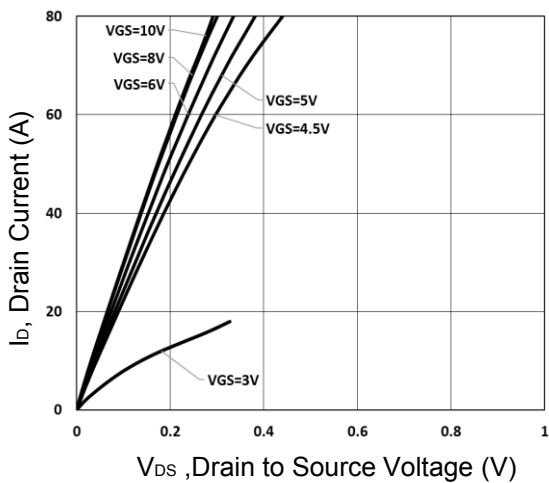
**Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_J$**



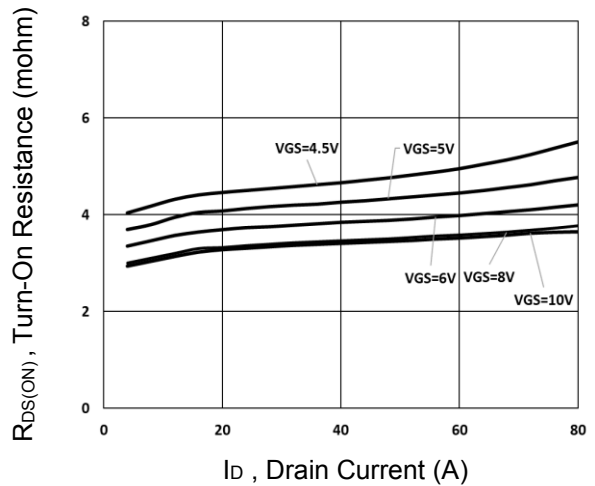
**Fig.3 Normalized  $V_{th}$  vs.  $T_J$**



**Fig.4 Gate Charge Characteristics**

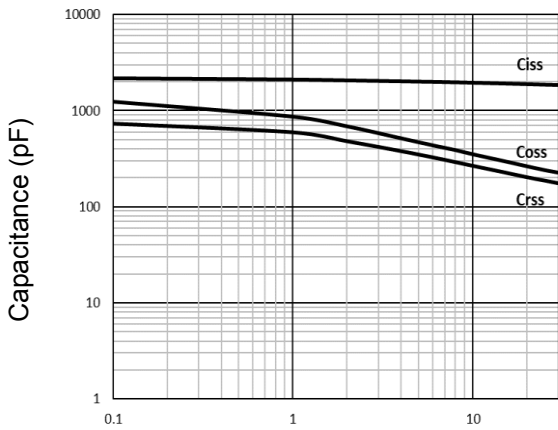


**Fig.5 Typical Output Characteristics**



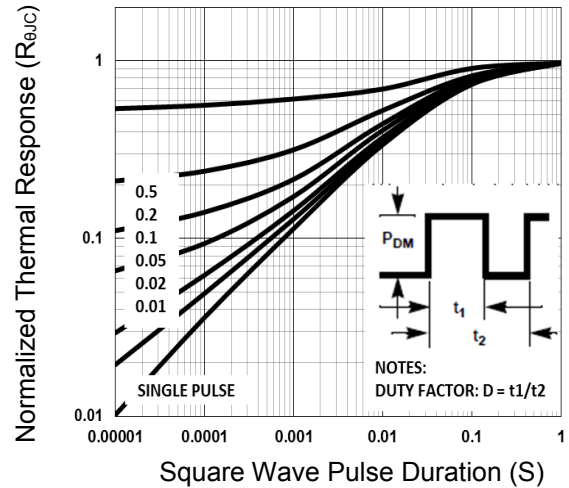
**Fig.6 Turn-On Resistance vs.  $I_D$**

**Typical Electrical and Thermal Characteristic Curves**

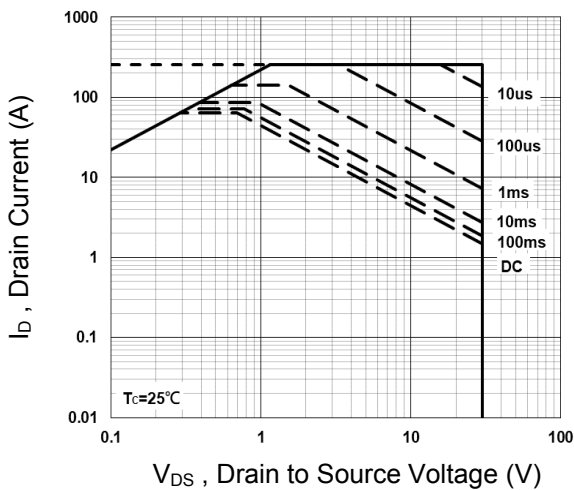


$V_{DS}$ , Drain to Source Voltage (V)

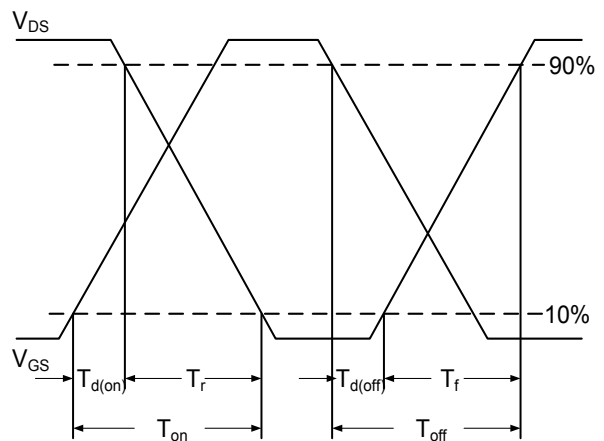
**Fig.7 Capacitance Characteristics**



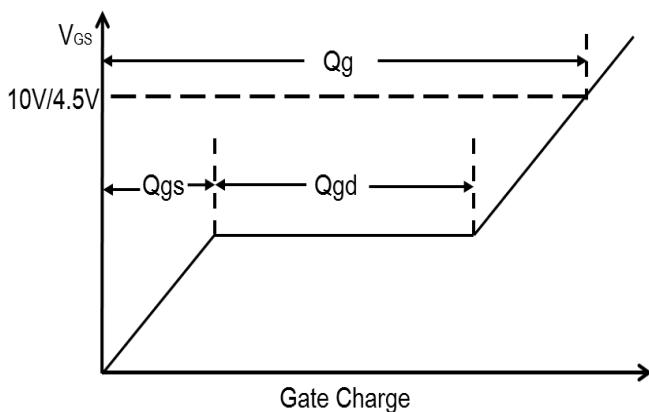
**Fig.8 Normalized Transient Impedance**



**Fig.9 Maximum Safe Operation Area**



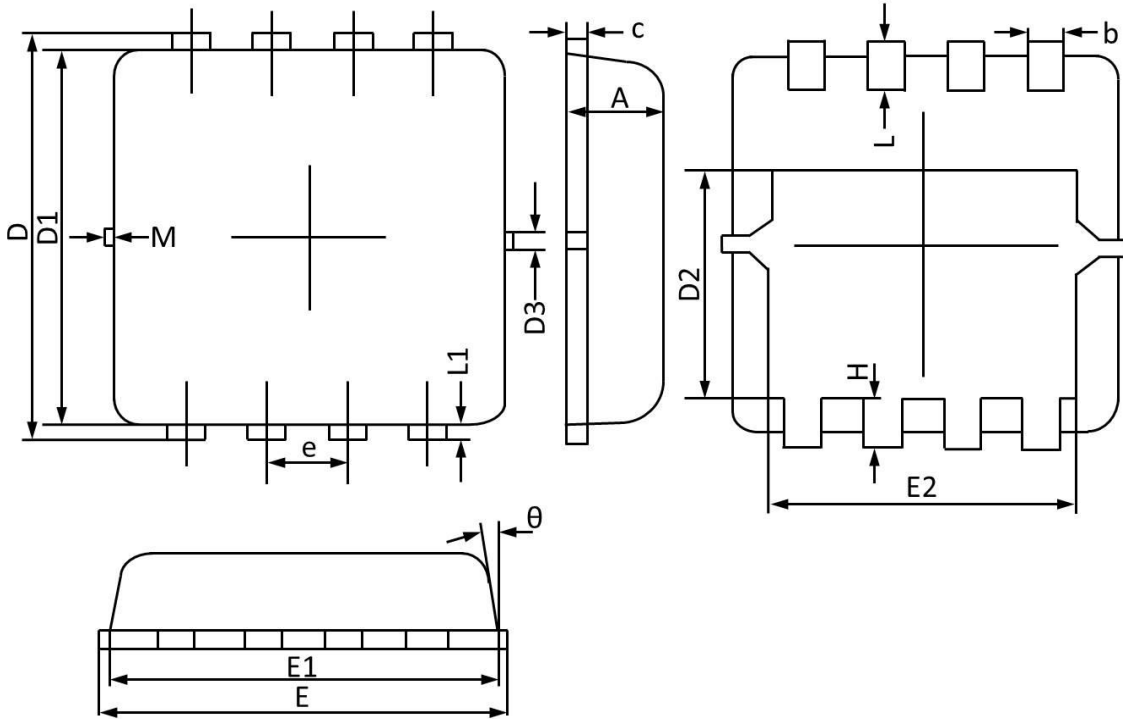
**Fig.10 Switching Time Waveform**



**Fig.11 Gate Charge Waveform**

**Package Outline Dimensions**

**PPAK3X3**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.700	0.800	0.028	0.031
b	0.250	0.350	0.010	0.013
c	0.100	0.250	0.004	0.009
D	3.250	3.450	0.128	0.135
D1	3.000	3.200	0.119	0.125
D2	1.780	1.980	0.070	0.077
D3	0.130 REF		0.005 REF	
E	3.200	3.400	0.126	0.133
E1	3.000	3.200	0.119	0.125
E2	2.390	2.590	0.094	0.102
e	0.650 BSC		0.026 BSC	
H	0.300	0.500	0.011	0.019
L	0.300	0.500	0.011	0.019
L1	0.130 REF		0.005 REF	
theta	0°	12°	0°	12°
M	0.150 REF		0.006 REF	