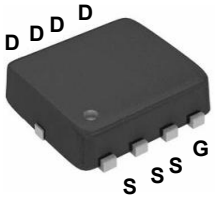
GOOD-ARK SEMICONDUCTOR

SSFN3964

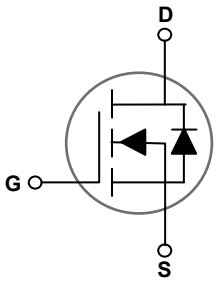
30V N-Channel MOSFET

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°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°C)	I_D	64	A
Drain Current – Continuous (T_C=100°C)		40	A
Drain Current – Pulsed[1]	I_{DM}	256	A
Single Pulse Avalanche Energy[2]	E_{AS}	115	mJ
Single Pulse Avalanche Current[2]	I_{AS}	48	A
Power Dissipation (T_C=25°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°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250uA	30	---	---	V
BV_{DSS} Temperature Coefficient	$\triangle BV_{DSS}/\triangle T_J$	Reference to 25°C, I_D=1mA	---	0.03	---	V/°C
Drain-Source Leakage Current	I_{DSS}	V_{DS}=30V, V_{GS}=0V, T_J=25°C	---	---	1	uA
		V_{DS}=24V, V_{GS}=0V, T_J=125°C	---	---	10	uA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	---	---	±100	nA
On Characteristics						
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=15A	---	3.6	4.5	mΩ
		V_{GS}=4.5V, I_D=10A	---	4.9	6.4	mΩ
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=250uA	1.0	1.6	2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\triangle V_{GS(th)}$		---	-4.17	---	mV/°C
Forward Transconductance	gfs	V_{DS}=10V, I_D=3A	---	10	---	S
Dynamic and Switching Characteristics						
Total Gate Charge[3, 4]	Q_g	V_{DS}=15V, V_{GS}=10V, I_D=15A	---	34.6	70	nC
Gate-Source Charge[3, 4]	Q_{gs}		---	5.5	11	
Gate-Drain Charge[3, 4]	Q_{gd}		---	6.8	13	
Turn-On Delay Time[3, 4]	$T_{d(on)}$	V_{DD}=15V, V_{GS}=10V, R_G=3.3Ω, I_D=1A	---	9.7	20	nS
Rise Time[3, 4]	T_r		---	15.8	31	
Turn-Off Delay Time[3, 4]	$T_{d(off)}$		---	37.4	75	
Fall Time[3, 4]	T_f		---	12	24	
Input Capacitance	C_{iss}	V_{DS}=15V, V_{GS}=0V, F=1MHz	---	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=1MHz	---	1.14	---	Ω
Drain-Source Diode Characteristics and Maximum Ratings						
Continuous Source Current	I_S	V_G=V_D=0V, 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°C	---	---	1	V

Note:
1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2. V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=48A, R_G=25Ω, Starting T_J=25°C.
3. The data tested by pulsed, pulse width ≦ 300uS, duty cycle ≦ 2%.
4. Essentially independent of operating temperature.

Typical Electrical and Thermal Characteristic Curves

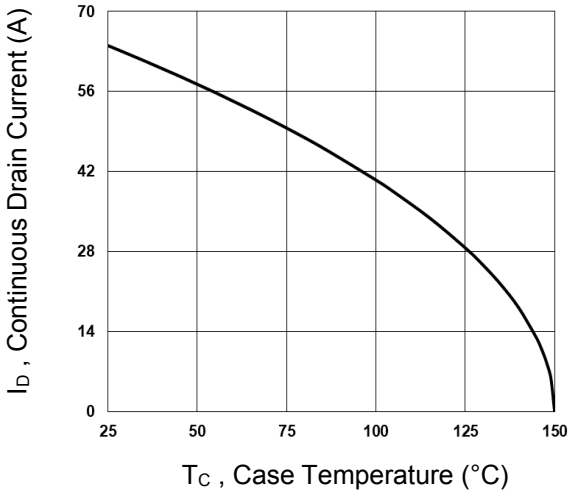


Fig.1 Continuous Drain Current vs. T_C

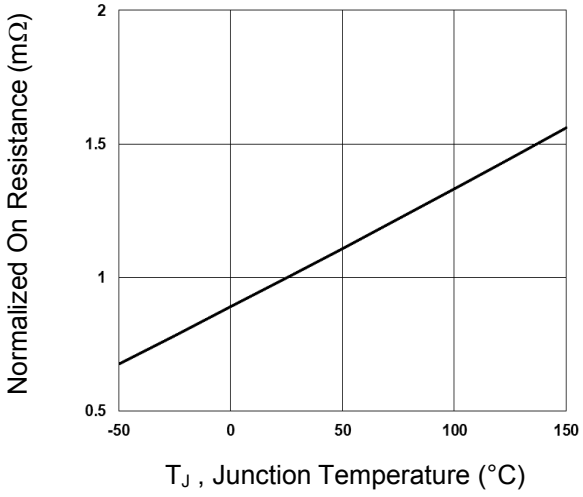


Fig.2 Normalized $R_{DS(ON)}$ vs. T_J

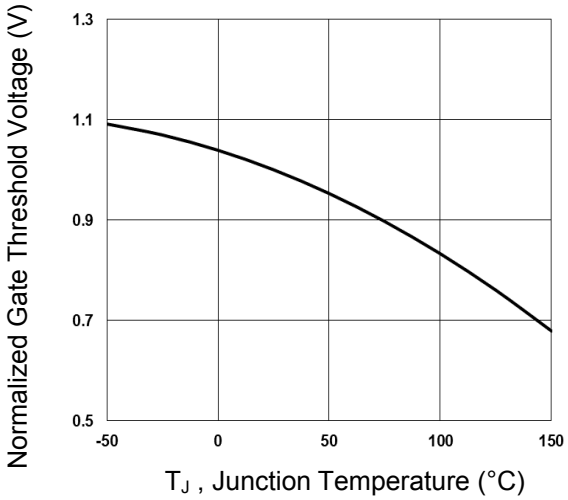


Fig.3 Normalized V_{th} vs. T_J

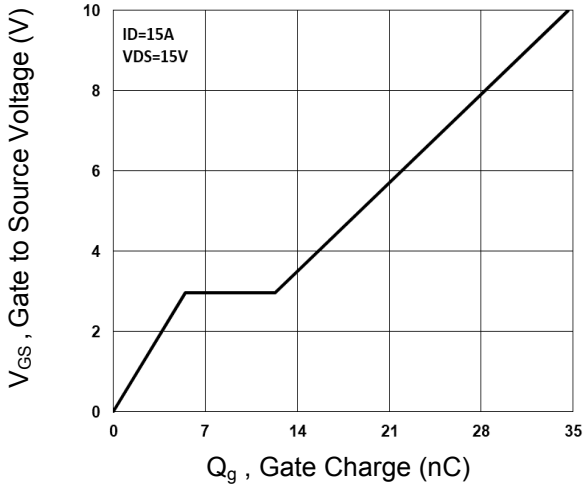


Fig.4 Gate Charge Characteristics

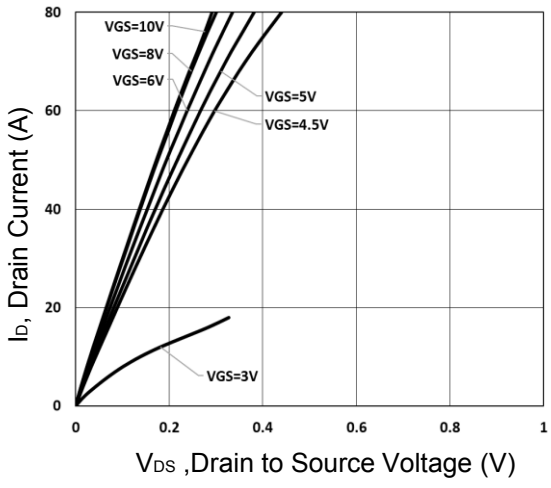


Fig.5 Typical Output Characteristics

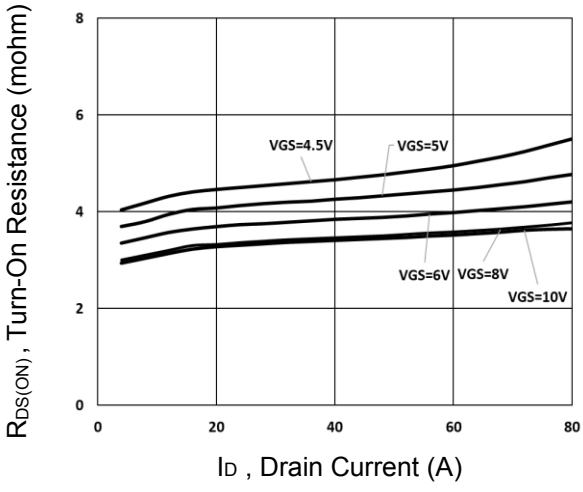


Fig.6 Turn-On Resistance vs. I_D

Typical Electrical and Thermal Characteristic Curves

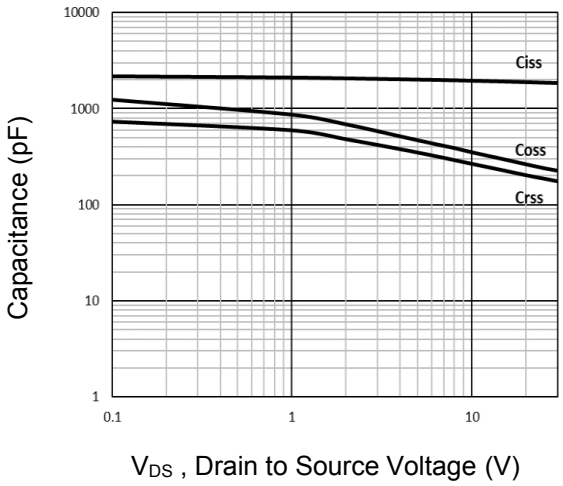


Fig.7 Capacitance Characteristics

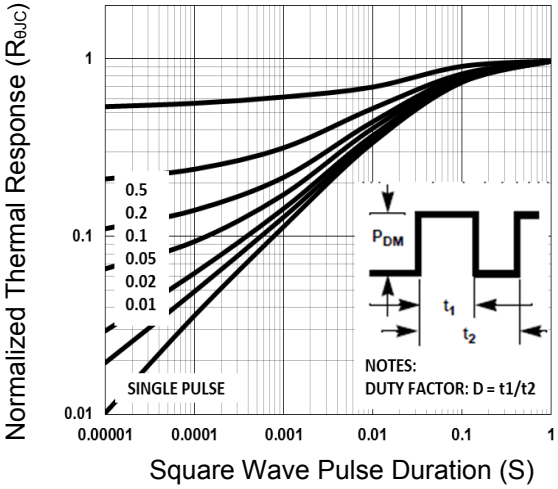


Fig.8 Normalized Transient Impedance

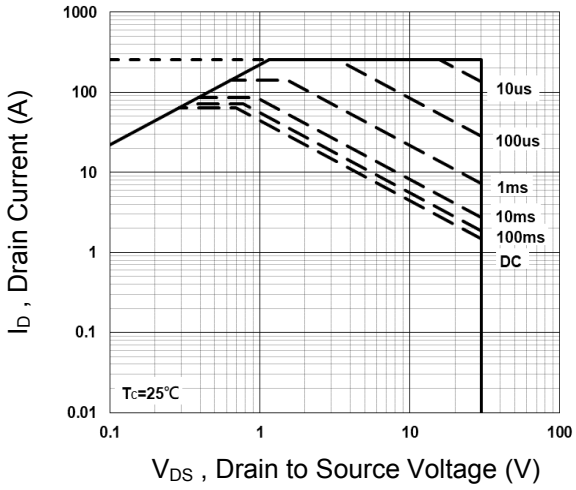


Fig.9 Maximum Safe Operation Area

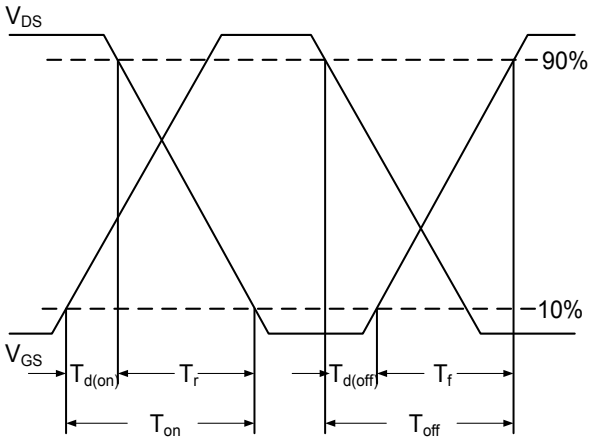


Fig.10 Switching Time Waveform

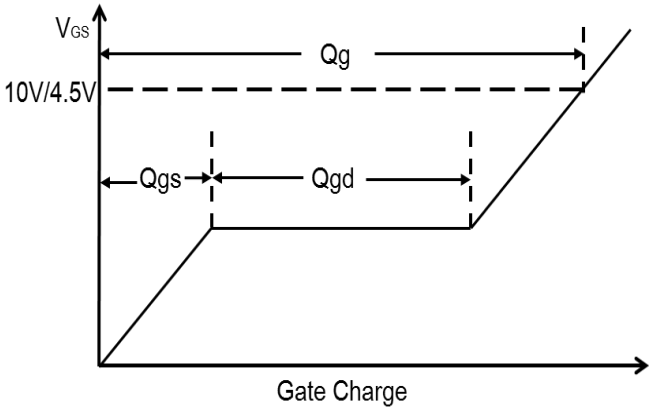
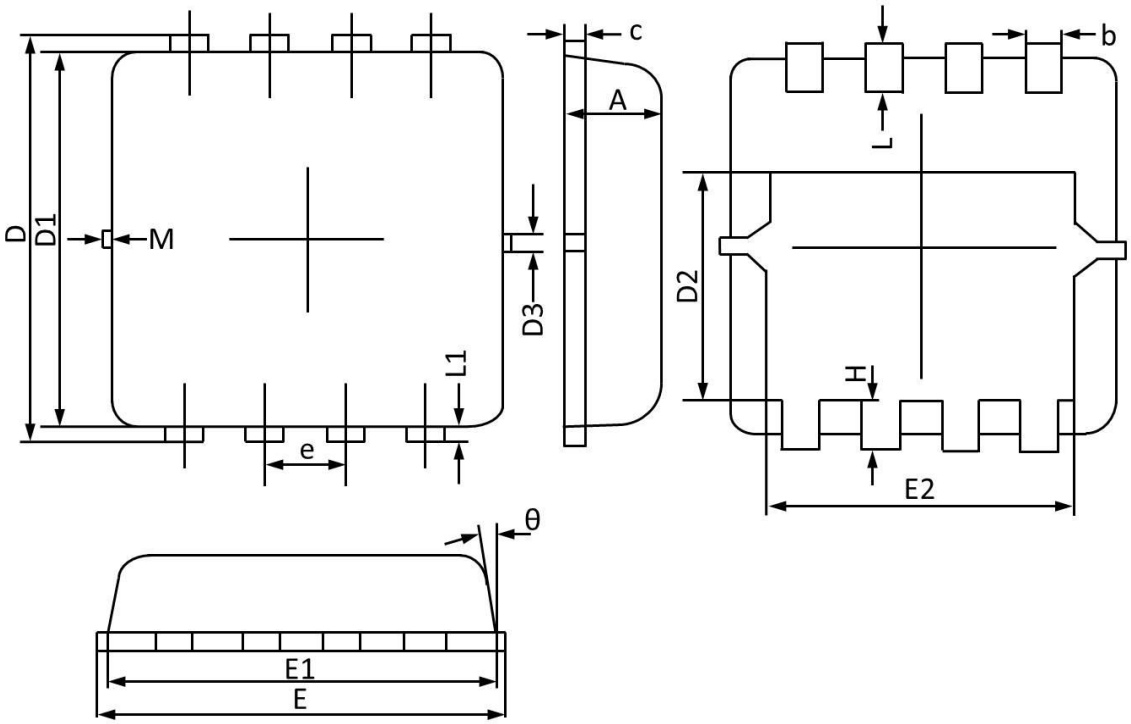


Fig.11 Gate Charge Waveform

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	
θ	0°	12°	0°	12°
M	0.150 REF		0.006 REF	