

### General Description

The WSR90N07 is the highest performance trench N-Ch MOSFET with extreme high cell density, which provide excellent R<sub>DS(on)</sub> and gate charge for most of the synchronous buck converter applications.

### Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

### Product Summary

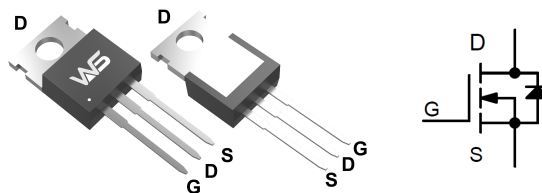
BV <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
72V	6.8mΩ	84A

### Applications

Switch.

Load.

### TO-220FB-3L Pin Configuration



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-to-Source voltage	72	V
V <sub>GS</sub>	Gate-to-Source voltage	±20	V
I <sub>D</sub>	Continuous drain current, V <sub>GS</sub> @10V (T <sub>c</sub> =25°C)	84	A
	Continuous drain current, V <sub>GS</sub> @10V (T <sub>c</sub> =100°C)	76	A
I <sub>DM</sub>	Pulsed drain current ①	310	A
P <sub>D</sub>	Power dissipation (T <sub>c</sub> =25°C)	181	W
	Linear derating factor (T <sub>c</sub> =25°C)	1.5	W/°C
E <sub>AS</sub>	Single pulse avalanche energy ②	400	mJ
T <sub>J</sub> T <sub>STG</sub>	Operating Junction and Storage Temperature Range	-55 to +175	°C
dv/dt	Peak diode recovery voltage	31	v/ns
E <sub>AR</sub>	Repetitive avalanche energy	TBD	

### Thermal Resistance

Symbol	Parameter	Min.	Typ.	Max.	Units
R <sub>θJC</sub>	Junction-to-case	-	0.83	-	°C/W
R <sub>θJA</sub>	Junction-to-ambient	-	-	62	°C/W

**Electrical Characteristics @T<sub>J</sub>=25°C (unless otherwise specified)**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV <sub>DSS</sub>	Drain-to-Source breakdown voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	72	-	-	V
I <sub>DSS</sub>	Drain-to-Source leakage current	V <sub>DS</sub> =68V, V <sub>GS</sub> =0V	-	-	2	μA
		V <sub>DS</sub> =68V, V <sub>GS</sub> =0V, T <sub>J</sub> =150°C	-	-	10	
I <sub>GSS</sub>	Gate-to-Source forward leakage	V <sub>GS</sub> =20V	-	-	100	nA
	Gate-to-Source reverse leakage	V <sub>GS</sub> =-20V	-	-	-100	
V <sub>GS(th)</sub>	Gate threshold voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.0	-	4.0	V
R <sub>DS(on)</sub>	Static Drain-to-Source on-resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =30A	-	7.2	8	mΩ
Q <sub>g</sub>	Total gate charge	I <sub>D</sub> =30A V <sub>DD</sub> =30V V <sub>GS</sub> =10V	-	90	-	nC
Q <sub>gs</sub>	Gate-to-Source charge		-	18	-	
Q <sub>gd</sub>	Gate-to-Drain("Miller") charge		-	28	-	
t <sub>d(on)</sub>	Turn-on delay time	V <sub>DD</sub> =30V I <sub>D</sub> =2A, R <sub>L</sub> =15Ω R <sub>G</sub> =2.5Ω V <sub>GS</sub> =10V	-	18.2	-	nS
t <sub>r</sub>	Rise time		-	15.6	-	
t <sub>d(off)</sub>	Turn-Off delay time		-	70.5	-	
t <sub>f</sub>	Fall time		-	13.8	-	
C <sub>iss</sub>	Input capacitance	V <sub>GS</sub> =0V V <sub>DS</sub> =25V f=1.0MHZ	-	3150	-	pF
C <sub>oss</sub>	Output capacitance		-	300	-	
C <sub>rss</sub>	Reverse transfer capacitance		-	240	-	

**Source-Drain Ratings and Characteristics**

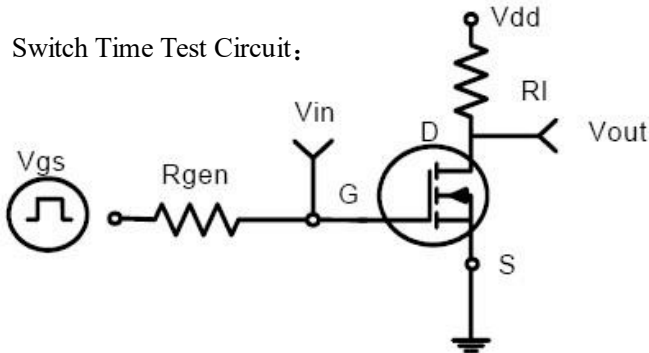
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I <sub>S</sub>	Continuous Source Current (Body Diode)		-	-	84	A
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	MOSFET symbol showing the integral reverse p-n junction diode.	-	-	310	A
V <sub>SD</sub>	Diode Forward Voltage	T <sub>J</sub> =25°C, I <sub>S</sub> =68A, V <sub>GS</sub> =0V ③	-	-	1.3	V
t <sub>rr</sub>	Reverse Recovery Time	T <sub>J</sub> =25°C, I <sub>F</sub> =68A, di/dt=100A/μs ③	-	57	-	nS
Q <sub>rr</sub>	Reverse Recovery Charge		-	107	-	nC
t <sub>on</sub>	Forward Turn-on Time	Intrinsic turn-on time is negligible (turn-on is dominated by L <sub>S</sub> + L <sub>D</sub> )				

Notes:

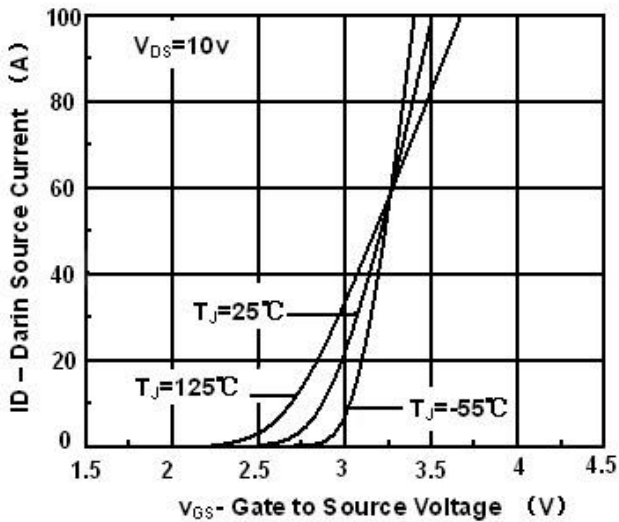
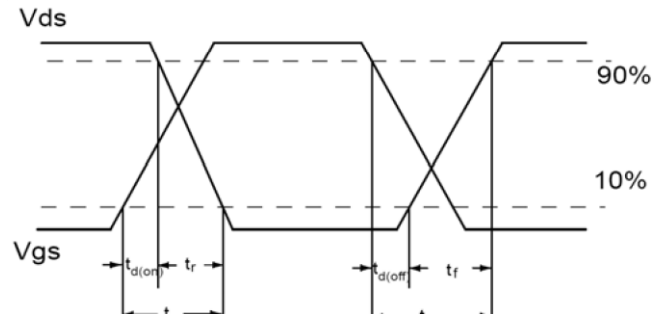
- ① Repetitive rating; pulse width limited by max junction temperature.
- ② Test condition: L =0.3mH, I<sub>D</sub> = 37A, V<sub>DD</sub> = 30V
- ③ Pulse width≤300μS, duty cycle≤1.5% ; R<sub>G</sub> = 25Ω Starting T<sub>J</sub> = 25°C

**Typical Operating Characteristics**

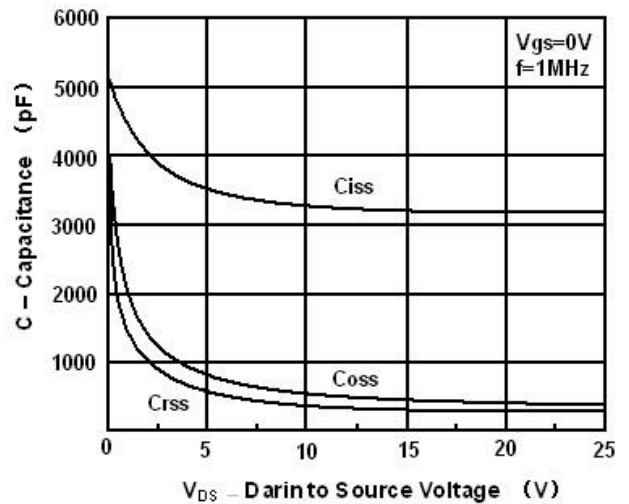
Switch Time Test Circuit:



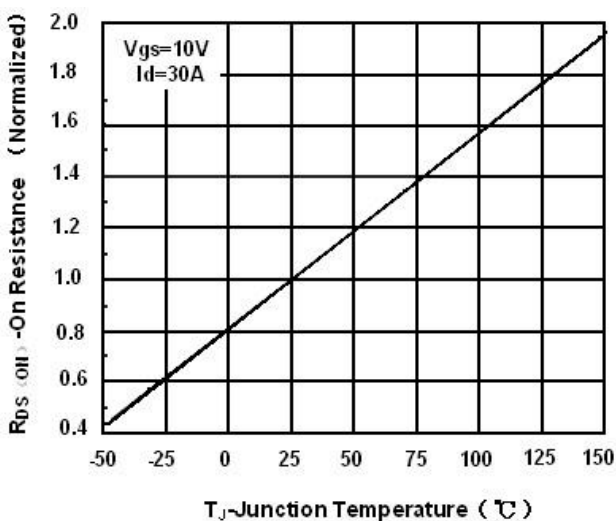
Switch Waveforms:



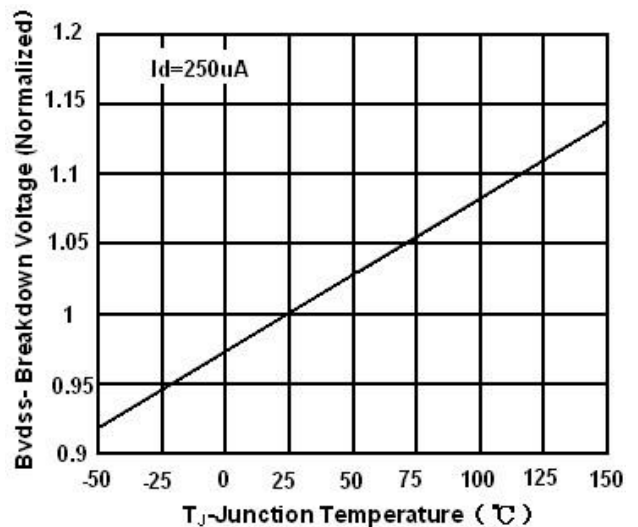
**Transfer Characteristic**



**Capacitance**

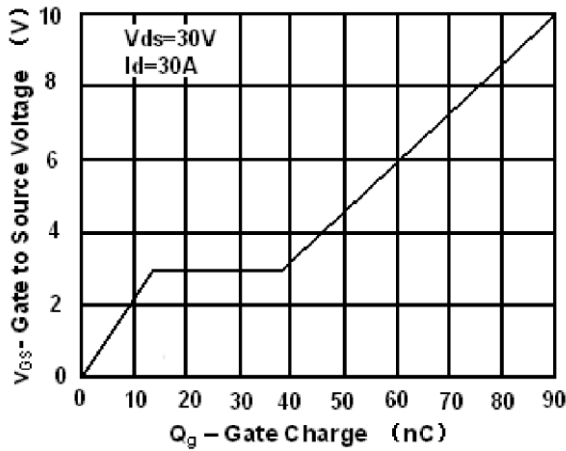


**On Resistance vs. Junction Temperature**

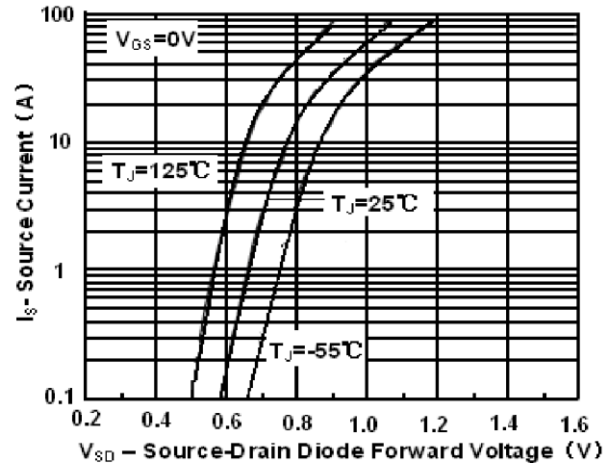


**Breakdown Voltage vs. Junction Temperature**

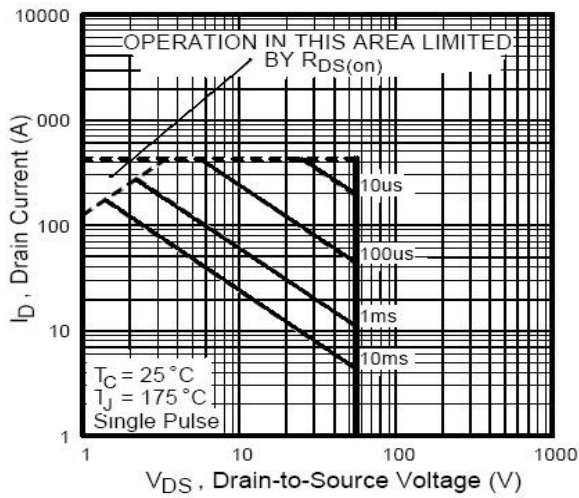
**Typical Operating Characteristics (Cont.)**



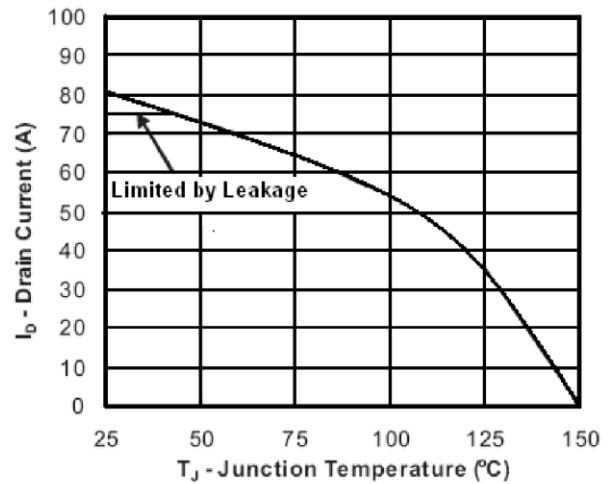
**Gate Charge**



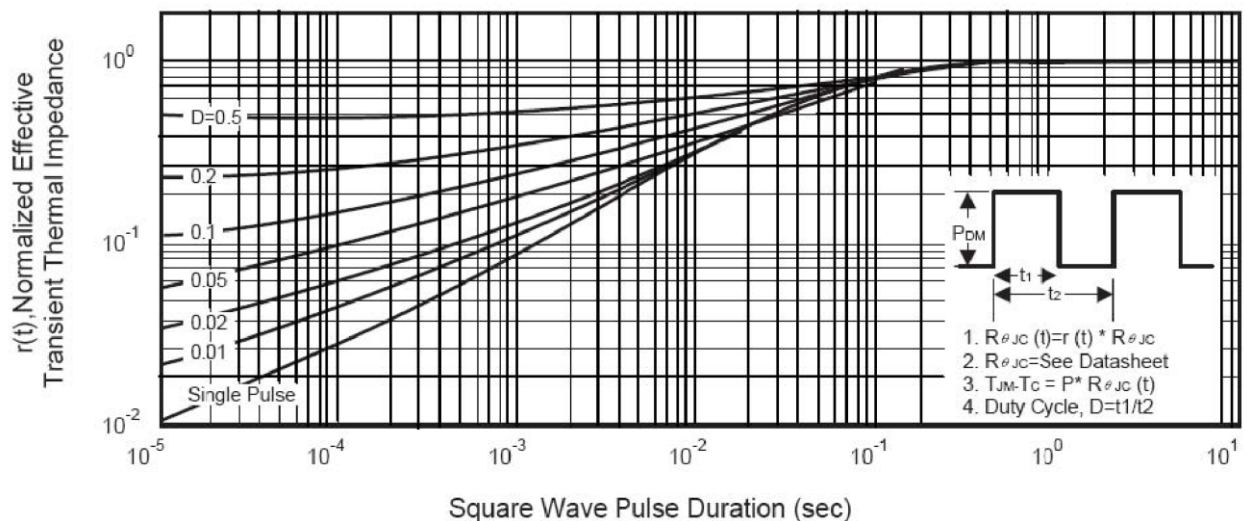
**Source-Drain Diode Forward Voltage**



**Safe Operation Area**



**Max Drain Current vs. Junction Temperature**



**Transient Thermal Impedance Curve**

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