

General Description

The WSR90N07 is the highest performance trench N-Ch MOSFET with extreme high cell density, which provide excellent R_{DS(on)} 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

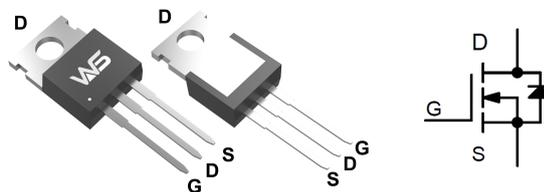
BV _{DSS}	R _{DS(on)}	I _D
72V	6.8mΩ	84A

Applications

Switch.

Load.

TO-220FB-3L Pin Configuration



Absolute Maximum Ratings

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

Thermal Resistance

Symbol	Parameter	Min.	Typ.	Max.	Units
R _{θJC}	Junction-to-case	-	0.83	-	°C/W
R _{θJA}	Junction-to-ambient	-	-	62	°C/W

Electrical Characteristics @T_J=25°C (unless otherwise specified)

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

Source-Drain Ratings and Characteristics

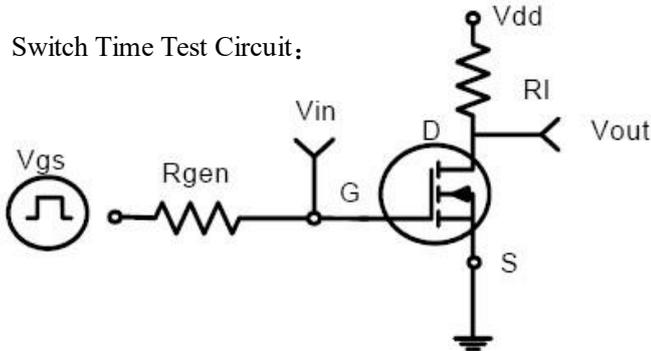
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I _S	Continuous Source Current (Body Diode)		-	-	84	A
I _{SM}	Pulsed Source Current (Body Diode) ①	MOSFET symbol showing the integral reverse p-n junction diode.	-	-	310	A
V _{SD}	Diode Forward Voltage	T _J =25°C, I _S =68A, V _{GS} =0V ③	-	-	1.3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

Notes:

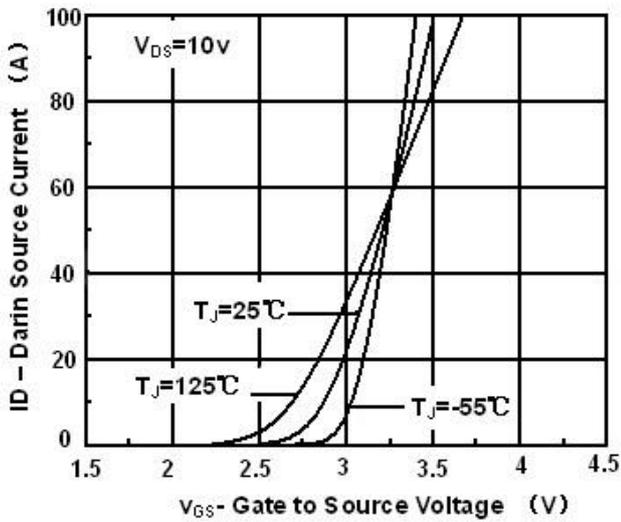
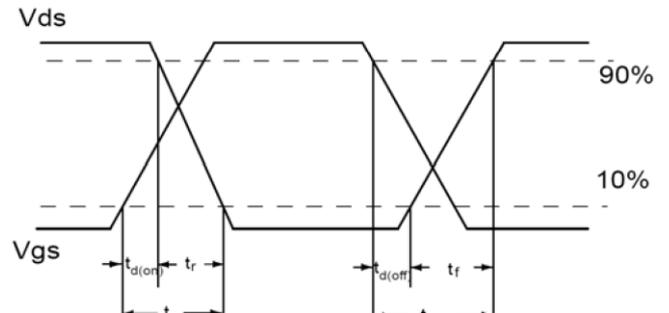
- ① Repetitive rating; pulse width limited by max junction temperature.
- ② Test condition: L =0.3mH, I_D = 37A, V_{DD} = 30V
- ③ Pulse width≤300μS, duty cycle≤1.5% ; R_G = 25Ω Starting T_J = 25°C

Typical Operating Characteristics

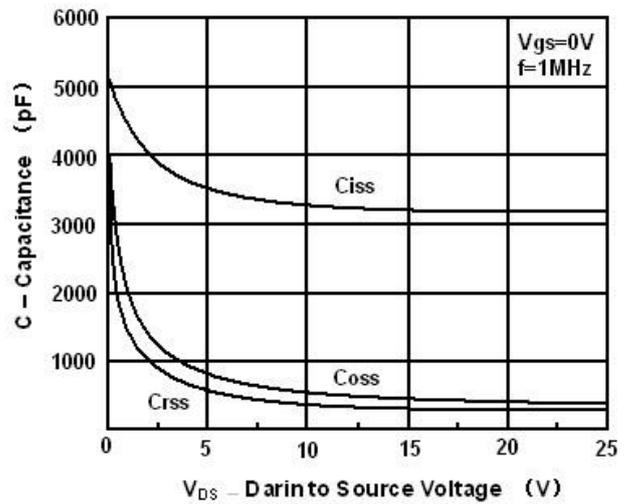
Switch Time Test Circuit:



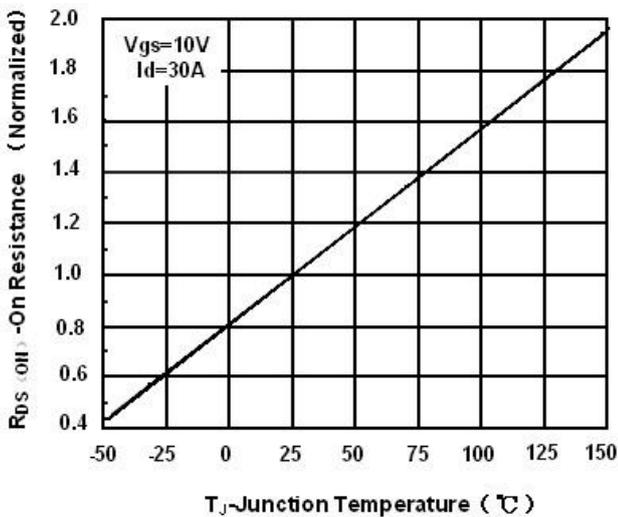
Switch Waveforms:



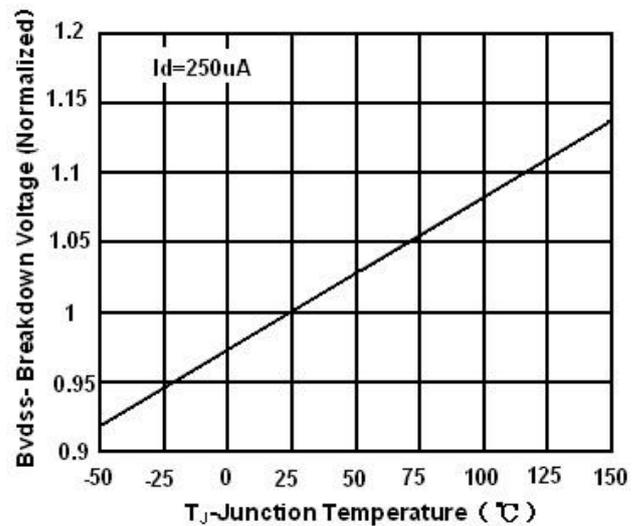
Transfer Characteristic



Capacitance

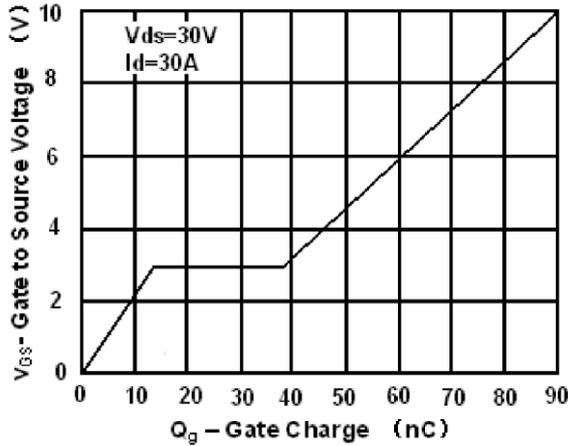


On Resistance vs. Junction Temperature

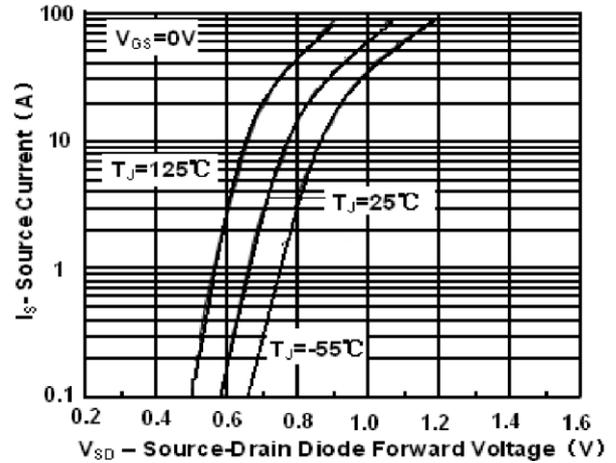


Breakdown Voltage vs. Junction Temperature

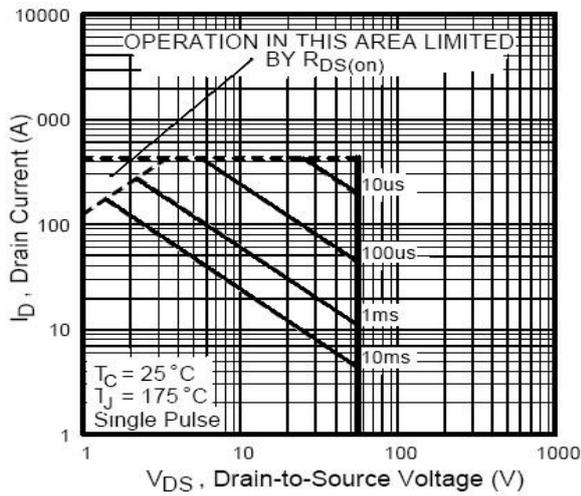
Typical Operating Characteristics (Cont.)



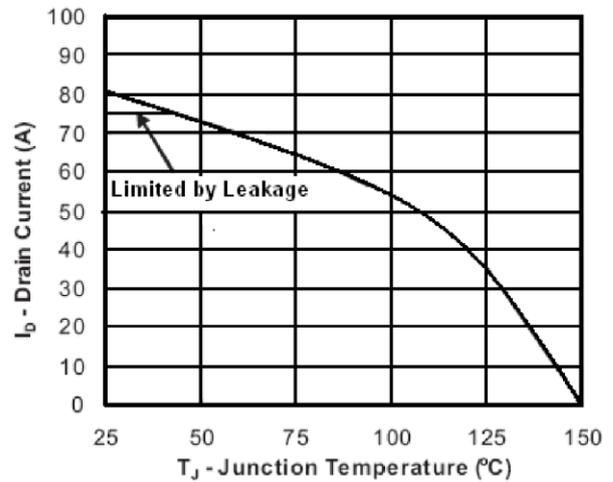
Gate Charge



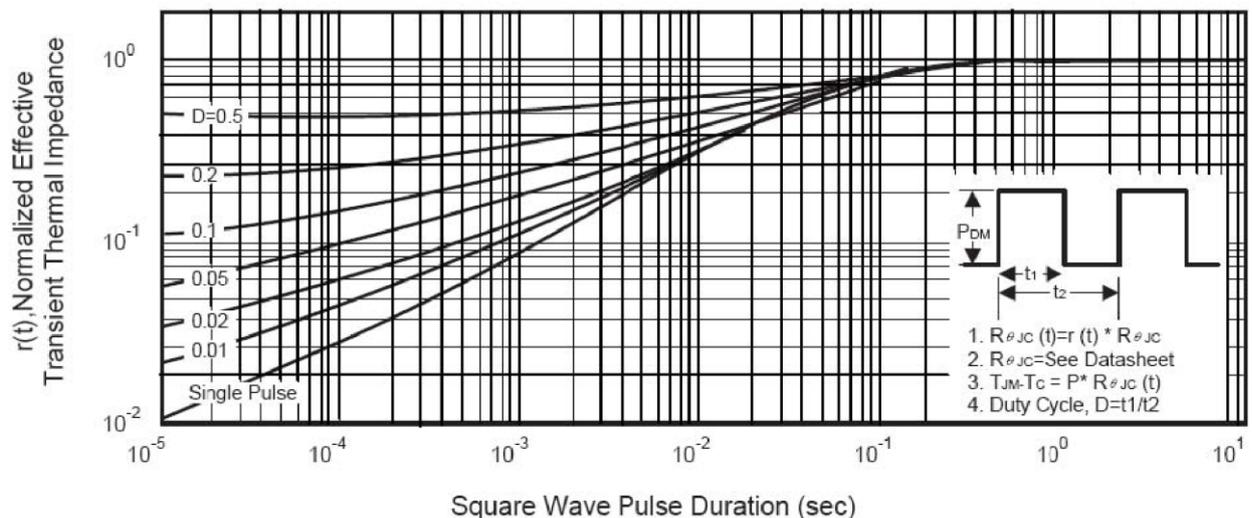
Source-Drain Diode Forward Voltage



Safe Operation Area



Max Drain Current vs. Junction Temperature



Transient Thermal Impedance Curve



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