

Description

The LM90N02NF uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS} = 20V$ $I_D = 90A$

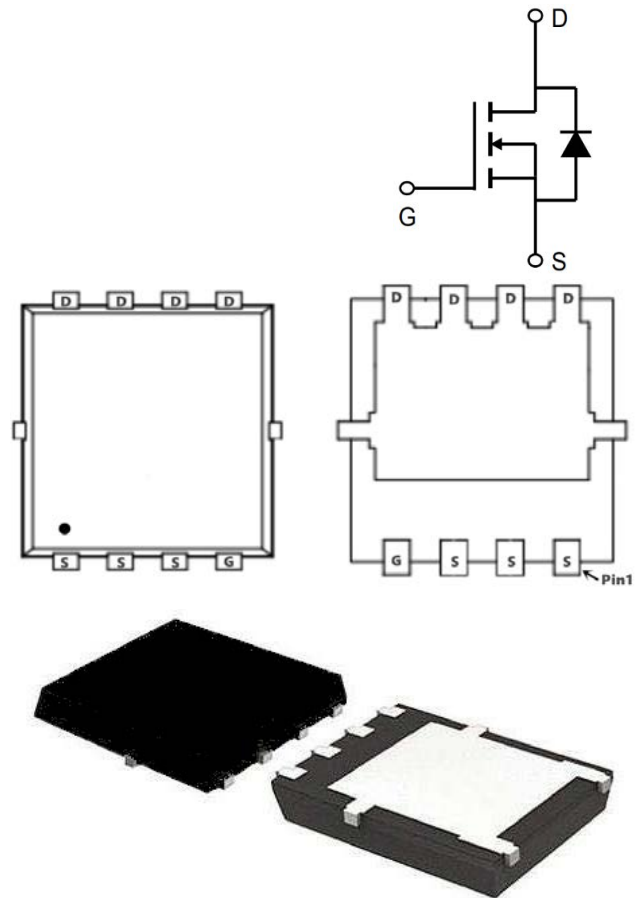
$R_{DS(ON)} < 2m\Omega$ @ $V_{GS} = 10V$

Application

Battery protection

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
LM90N02NF	DFN5*6-8		5000

Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	± 12	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current ¹	90	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current ¹	48	A
IDM	Pulsed Drain Current ²	270	A
EAS	Single Pulse Avalanche Energy ³	80	mJ
IAS	Avalanche Current	40	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation ⁴	83	W
TSTG	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-ambient ¹ ($t \leq 10S$)	20	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction-ambient ¹ (Steady State)	55	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-case ¹	1.5	$^\circ C/W$

Electrical Characteristics (T_c=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
BVDSS	Drain-Source Breakdown Voltage	V _{GS} =0V , I _D =250uA	20	23	---	V
VGS(th)	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	0.5	0.68	1.0	V
RDS(ON)	Static Drain-Source On-Resistance ²	V _{GS} =10V , I _D =20A	---	1.6	2.0	mΩ
RDS(ON)	Static Drain-Source On-Resistance ²	V _{GS} =4.5V , I _D =20A	---	1.9	2.5	mΩ
RDS(ON)	Static Drain-Source On-Resistance ²	V _{GS} =2.5V , I _D =20A	---	2.8	3.8	mΩ
IDSS	Drain-Source Leakage Current	V _{DS} =16V , V _{GS} =0V , T _J =25°C	---	---	1	uA
		V _{DS} =16V , V _{GS} =0V , T _J =125°C	---	---	5	
IGSS	Gate-Source Leakage Current	V _{GS} =±10V , V _{DS} =0V	---	---	±10	uA
Rg	Gate Resistance	V _{DS} =0V , V _{GS} =0V , f=1MHz	---	1.2	---	Ω
Qg	Total Gate Charge (10V)	V _{DS} =15V , V _{GS} =10V , I _D =20A	---	77	---	nC
Qgs	Gate-Source Charge		---	8.7	---	
Qgd	Gate-Drain Charge		---	14	---	
Td(on)	Turn-On Delay Time	V _{DD} =15V , V _{GS} =10V , R _G =3Ω , I _D =20A	---	10.2	---	ns
T _r	Rise Time		---	11.7	---	
Td(off)	Turn-Off Delay Time		---	56.4	---	
T _f	Fall Time		---	16.2	---	
Ciss	Input Capacitance	V _{DS} =10V , V _{GS} =0V , f=1MHz	---	4307	---	pF
Coss	Output Capacitance		---	501	---	
Crss	Reverse Transfer Capacitance		---	321	---	
IS	Continuous Source Current ^{1,5}	V _G =V _D =0V , Force Current	---	---	50	A
VSD	Diode Forward Voltage ²	V _{GS} =0V , I _S =1A , T _J =25°C	---	---	1.2	V
trr	Reverse Recovery Time	IF=20A , di/dt=100A/μs , T _J =25°C	---	22	---	nS
Q _{rr}	Reverse Recovery Charge		---	72	---	nC

Note :

- 1、 The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2、 The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3、 The EAS data shows Max. rating . The test condition is VDD=16V,VGS=10V,L=0.1mH,IAS=39A
- 4、 The power dissipation is limited by 175°C junction temperature
- 5、 The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

Typical Characteristics

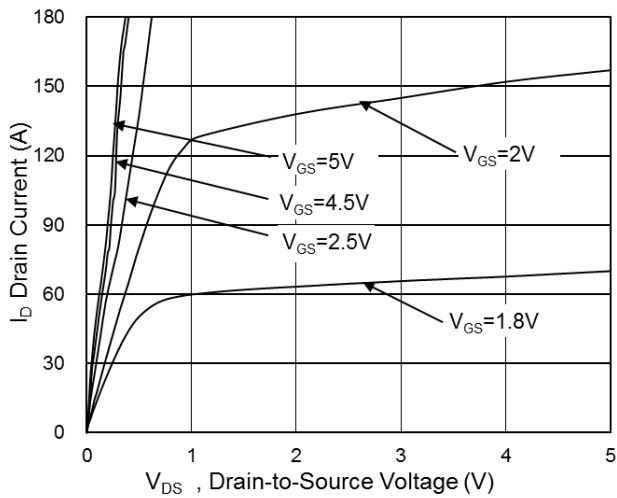


Fig.1 Typical Output Characteristics

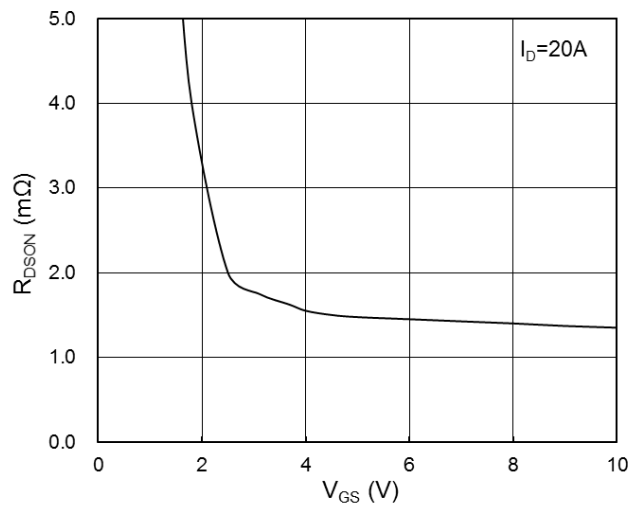


Fig.2 On-Resistance vs. Gate-Source Voltage

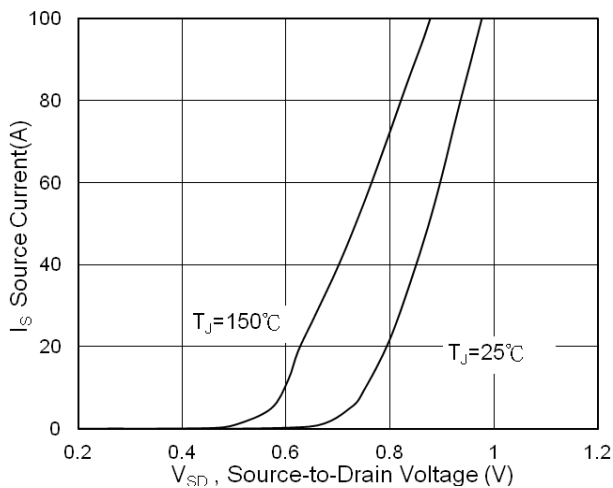


Fig.3 Forward Characteristics of Reverse

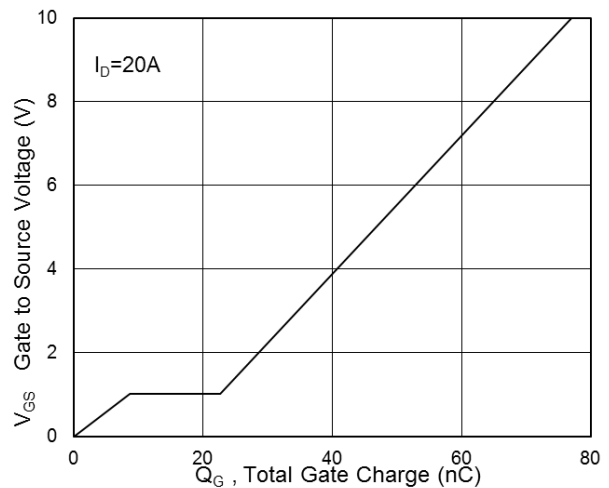


Fig.4 Gate-Charge Characteristics

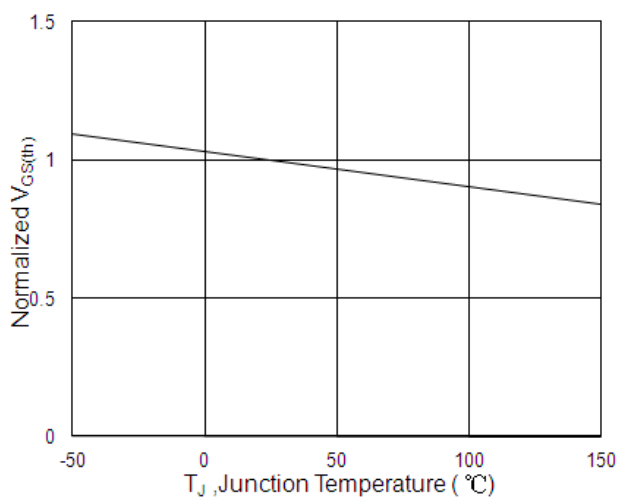


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

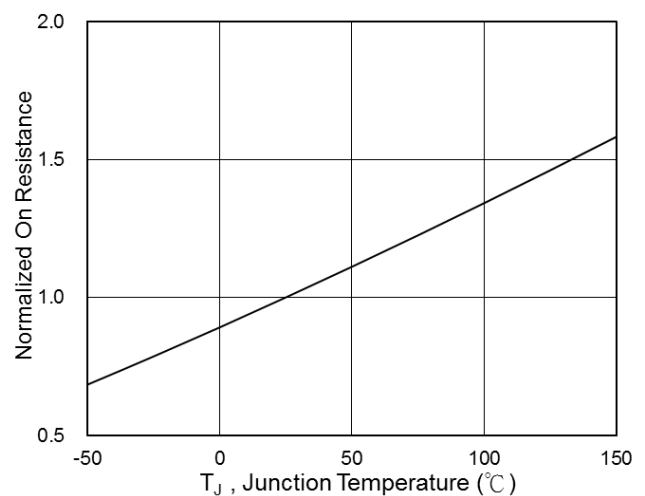


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

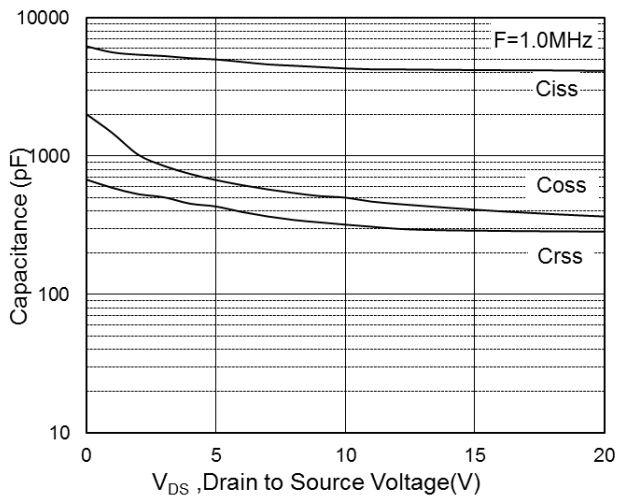


Fig.7 Capacitance

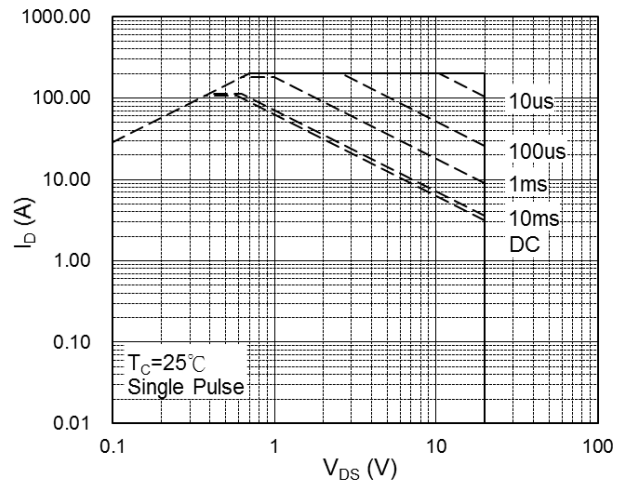


Fig.8 Safe Operating Area

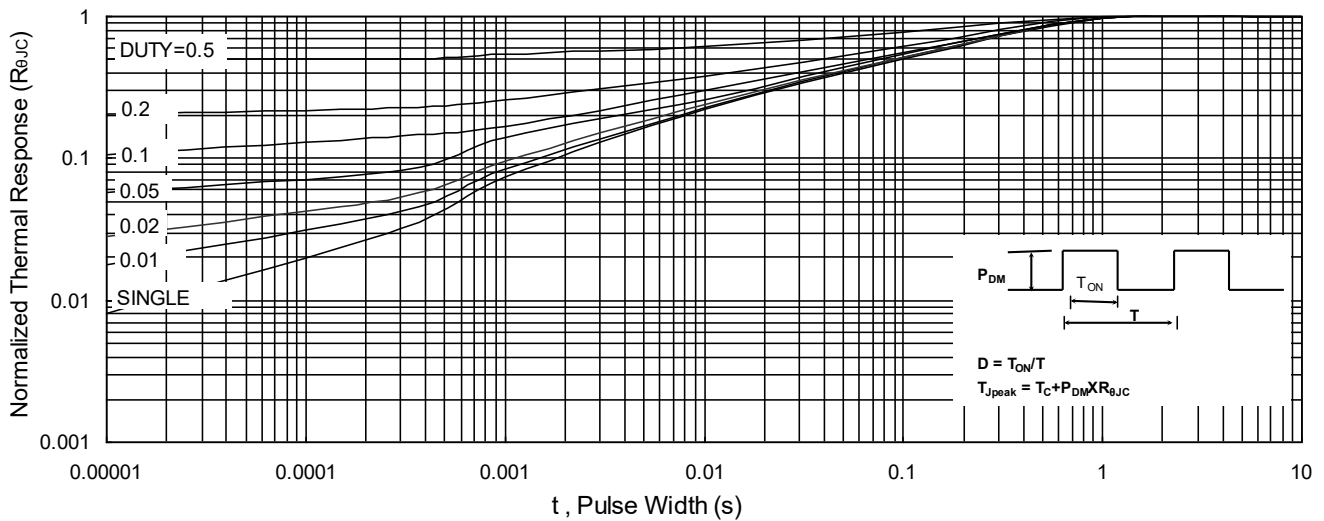


Fig.9 Normalized Maximum Transient Thermal Impedance

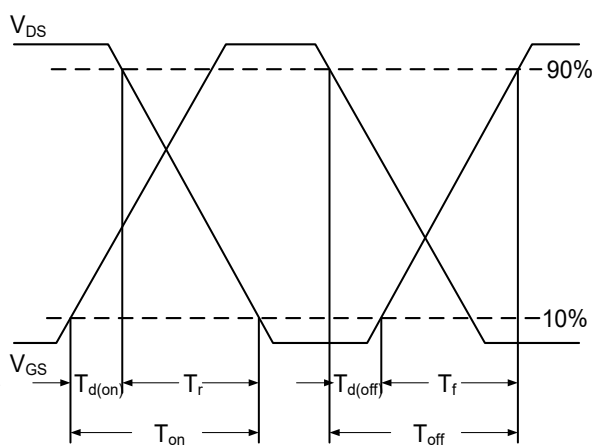


Fig.10 Switching Time Waveform

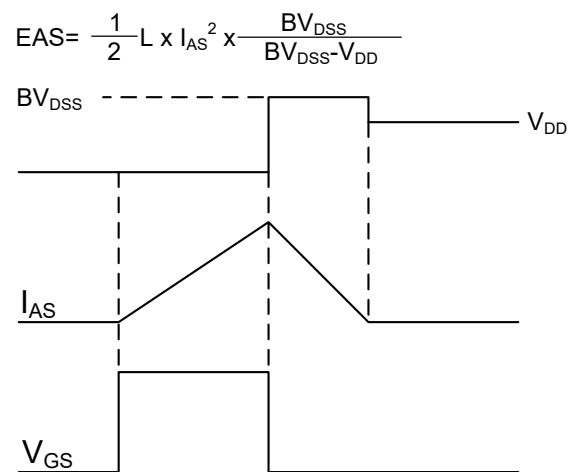
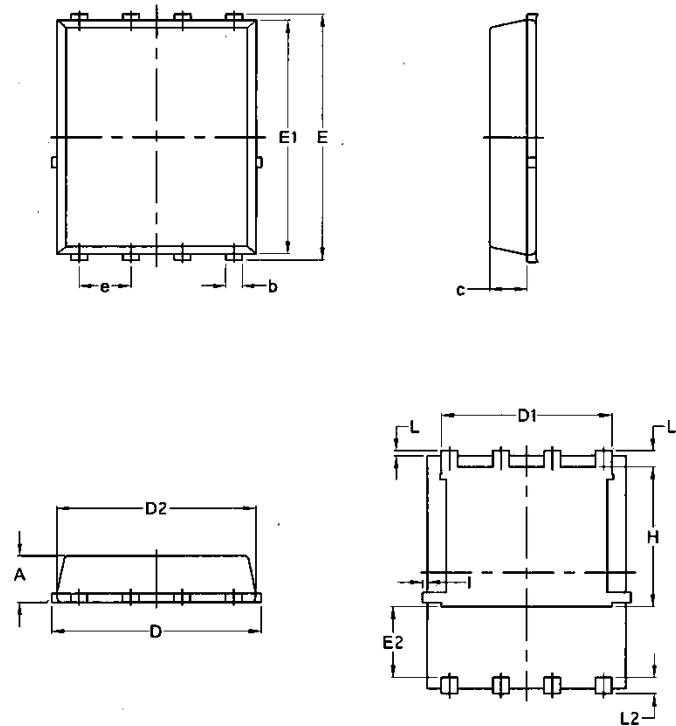


Fig.11 Unclamped Inductive Switching Waveform

Package Mechanical Data-DFN5*6-8-JQ Single



Symbol	Common			
	mm		Inch	
	Mim	Max	Min	Max
A	1.03	1.17	0.0406	0.0461
b	0.34	0.48	0.0134	0.0189
c	0.824	0.0970	0.0324	0.082
D	4.80	5.40	0.1890	0.2126
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.00	0.1890	0.1969
E	5.95	6.15	0.2343	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	1.60	/	0.0630	/
e	1.27 BSC		0.05 BSC	
L	0.05	0.25	0.0020	0.0098
L1	0.38	0.50	0.0150	0.0197
L2	0.38	0.50	0.0150	0.0197
H	3.30	3.50	0.1299	0.1378
I	/	0.18	/	0.0070