

N channel Power MOSFET

Monolithic IC MP1001N10T2

Outline

Low ON-state resistance with low driving voltage 100V maximum rating N-channel power MOSFET. Ideal for secondary-side synchronous rectifier switch on the AC/DC power supply unit.

Features

- | | |
|-----------------------------|------------------|
| 1. Drain - source voltage : | 100V |
| 2. Drain current : | 40A |
| 3. ON-state resistance : | 10.5mΩ @Vgs=4.5V |

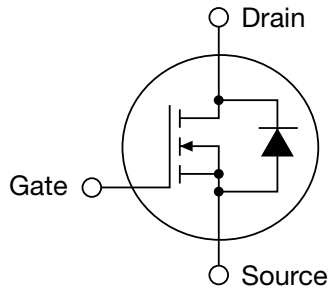
Package

TO-220FA

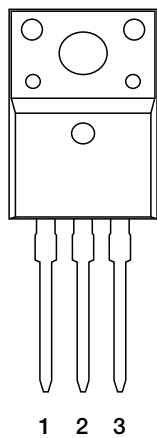
Applications

1. Secondary switch in synchronous rectification circuit
2. DC/DC Converter

Equivalent circuit



Pin Assignment



TO-220FA
(TOP VIEW)

1	Gate
2	Drain
3	Source

Pin Description

Pin No.	Pin name	Functions
1	Gate	Gate
2	Drain	Drain
3	Source	Source

Absolute Maximum Ratings (Except where noted otherwise Tc=25°C)

Item	Symbol	Ratings	Units
Drain-Source Voltage	$V_{(BR)DSS}$	100	V
Gate-Source Voltage	V_{GSS}	±20	V
Drain Current	DC (Tc=25°C)	I_D	40
	Pulsed	I_{DP}	160
Single Pulsed Avalanche Energy	E_{AS}	135	mJ
Power Dissipation (Tc=25°C)	P_D	41.7	W
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	-55~150	°C

Recommended Operating Conditions

Item	Symbol	Ratings	Units
Operating Ambient temperature	R_{thJC}	3.0	°C/W
Operating voltage	R_{thJA}	62.5	°C/W

Electrical Characteristics (Except where noted otherwise Tc=25°C)

Static Characteristics

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units	Measuring Circuit No.
Drain-Source Breakdown Voltage	BVDSS	ID=100μA, VGS=0V	100			V	1-C
Drain Cut-off Current	IDSS	VDS=100V, VGS=0V			10.0	uA	1-E
Gate Threshold Voltage	Vth	VDS=VGS, ID=1mA	1.8		2.5	V	1-A
Gate Leakage Current	IGSS	VGS=±20V, VDS=0V			±100	nA	1-D
Drain-Source ON Resistance	RDS (on)	VGS=10V, ID=30A		9.5	12.0	mΩ	1-B
		VGS=4.5V, ID=30A		10.5	13.0		
Transconductance	Gfs	ID=40A		180.0		S	1-A

Dynamic Characteristics

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units	Measuring Circuit No.
Total Gate Charge	Qg	VDS≐30V, VGS=10V, ID=30A		160		nC	2
Gate to Source Gate Charge	Qgs			30			
Gate to Drain Gate Charge	Qgd			40			
Switching Time	Turn-On	Td (on)		80		ns	3
	Rise Time	Tr		50			
	Turn-Off	Td (off)		200			
	Fall Time	Tf		40			
Input Capacitance	Ciss	VDS=25V, VGS=0V, f=100KHz		6000		pF	
Output Capacitance	Coss			500			
Reverse Transfer Capacitance	Crss			300			

Source-Drain Diode Ratings

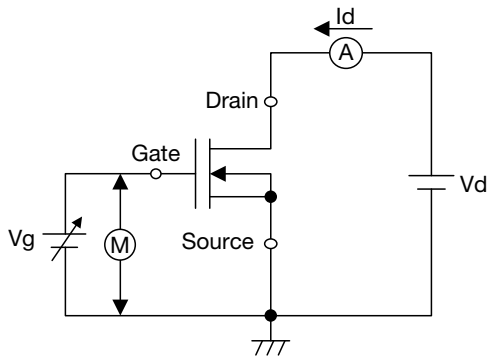
Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units	Measuring Circuit No.
Source Current	Continuous	IS=40A, VGS=0V			40	A	1-E
	Pulsed				160		
Diode Forward Voltage	VSD	IS=40A, VGS=0V		0.9	1.2	V	1-C
Reverse Recovery Time	Trr	VR≐40V, IS=40A, dIS/dt=100A/μs		60		ns	
Reverse Recovery Charge	Qrr			120		nC	

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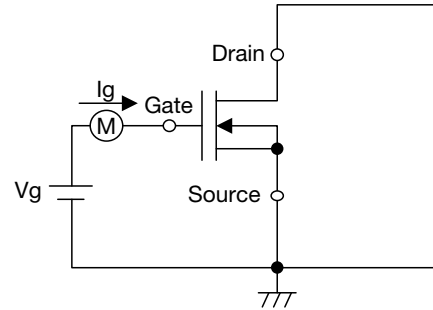
Measuring Circuit

(1) Static Characteristics

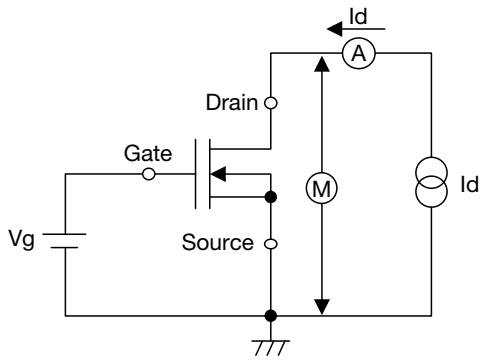
(A)



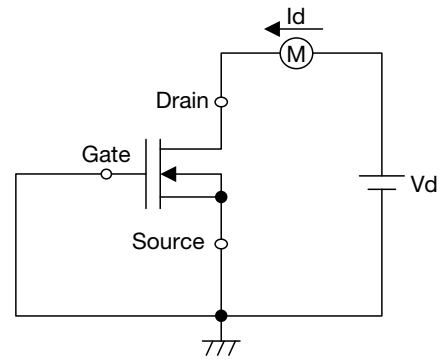
(D)



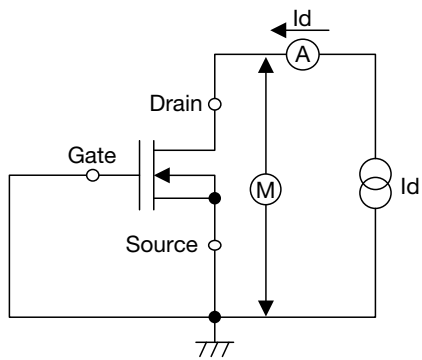
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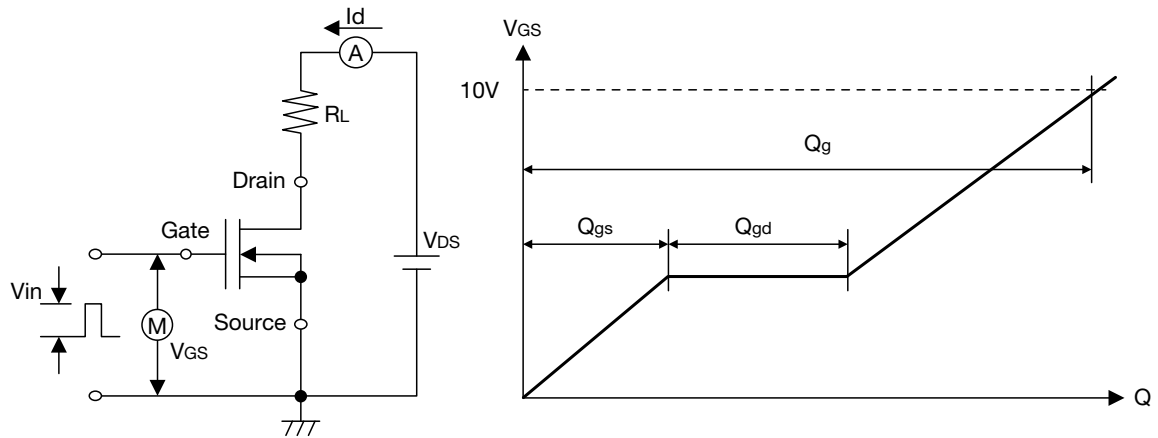
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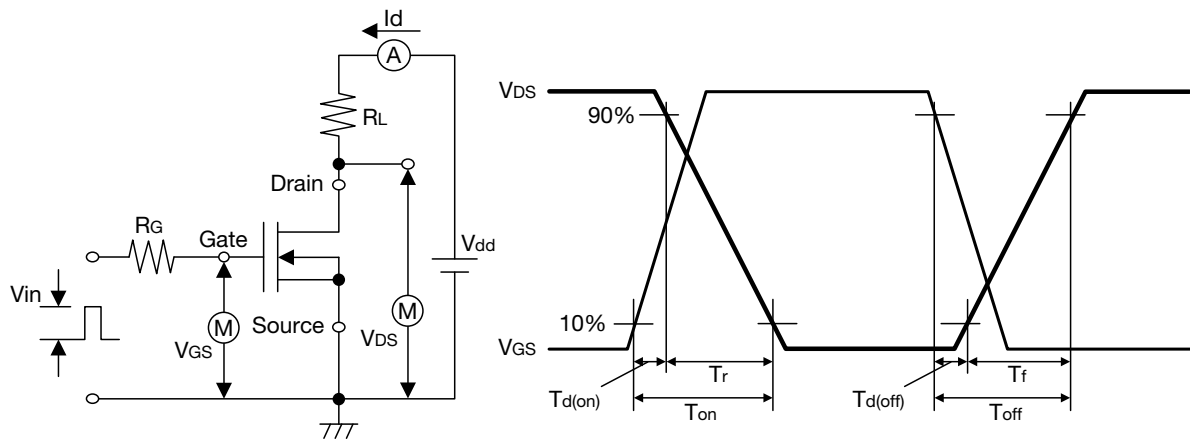
(C)



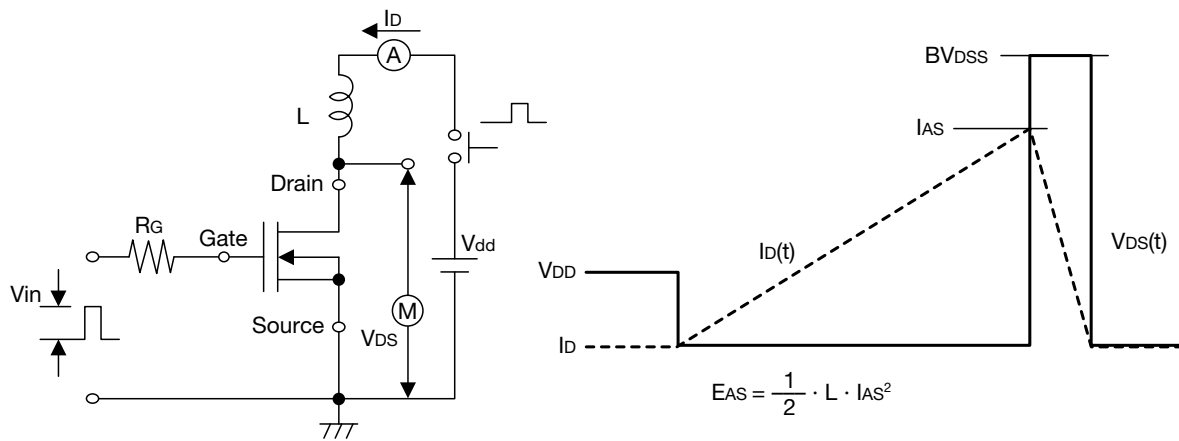
(2) Gate Charge Test



(3) Resistive Load Switching Test



(4) Avaranche Energy Test



Characteristics (Except where noted otherwise $T_c=25^\circ\text{C}$)

Fig.1 ID-VGS

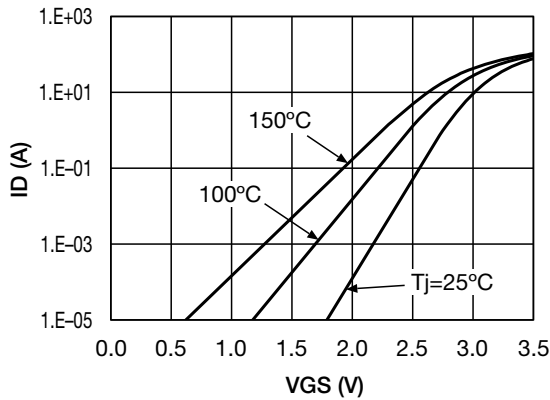


Fig.2 Vth-Tj

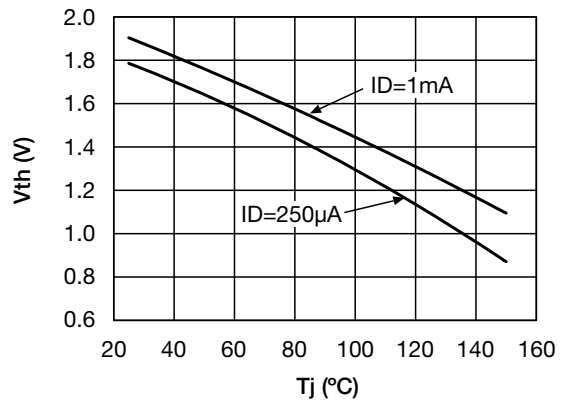


Fig.3 ID-VDS

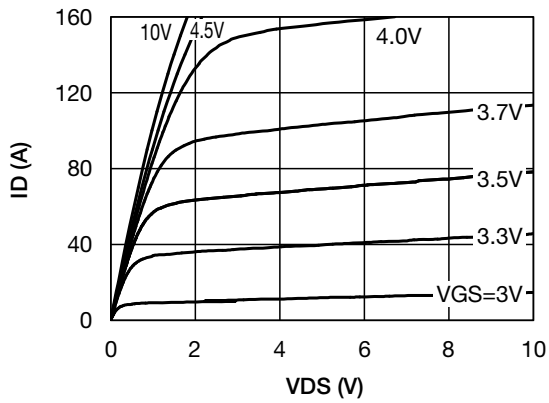


Fig.4 Ron-ID

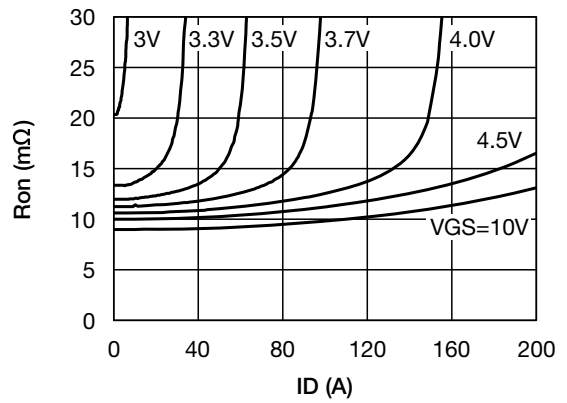


Fig.5 Ron-Tj

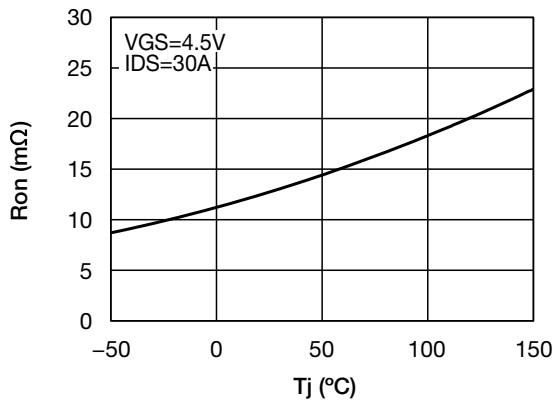


Fig.6 BVDSS-Tj

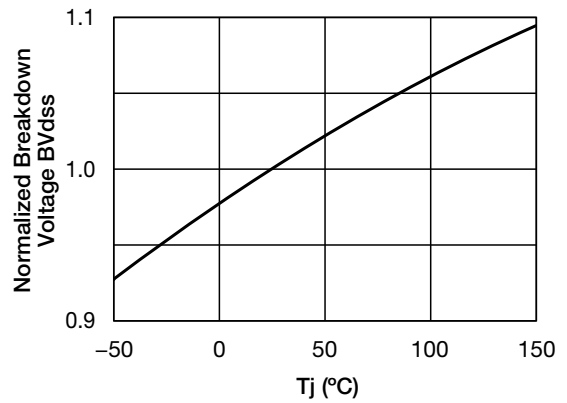
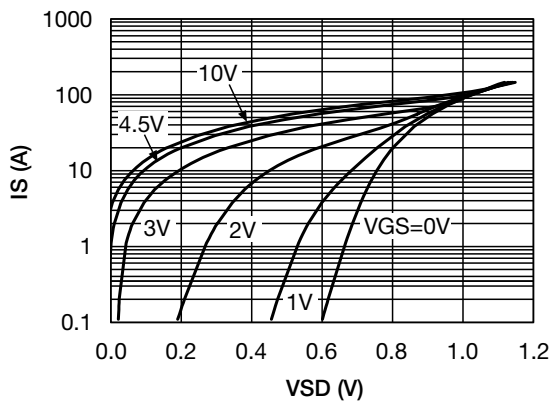


Fig.7 IS-VSD



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Fig.8 C-VDS

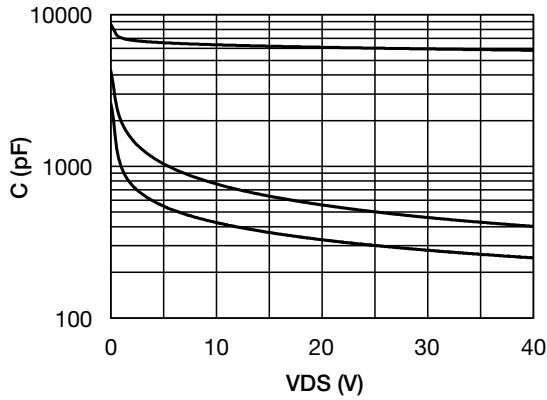


Fig.9 VGS-Q

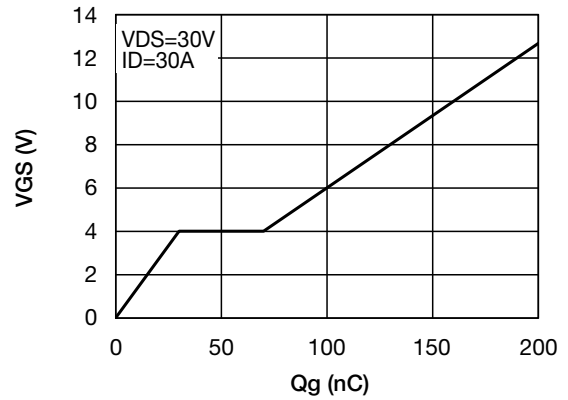


Fig.10 PD-Tc

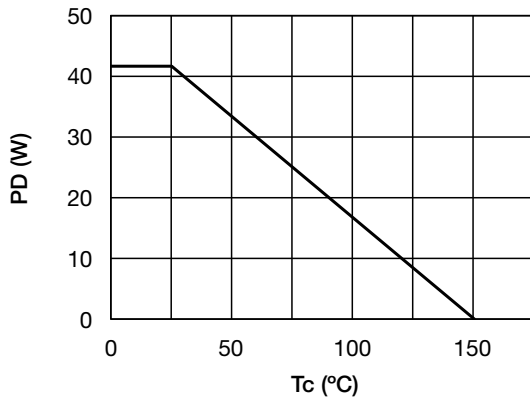


Fig.11 ID-Tc

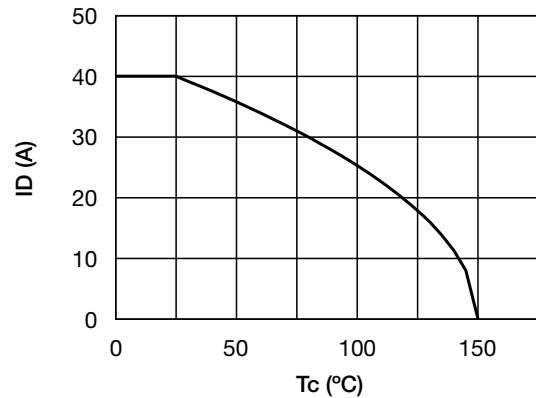


Fig.12 Transient Thermal Response Curve

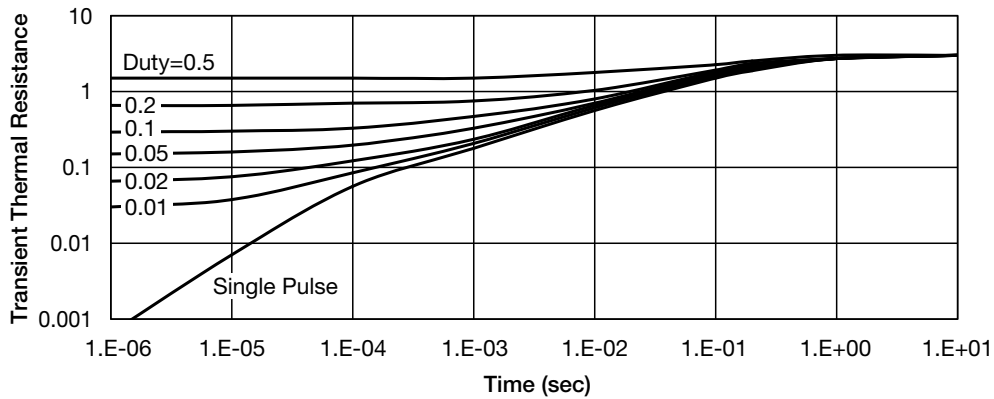
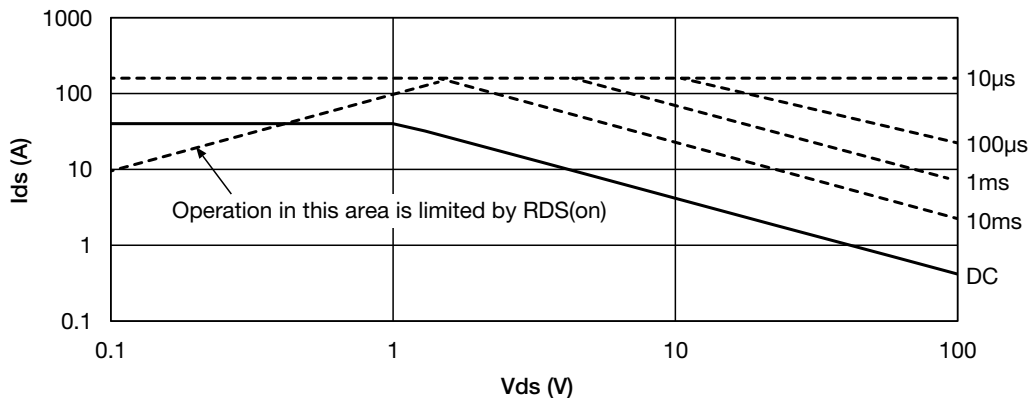


Fig.13 Safe Operation Area



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