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

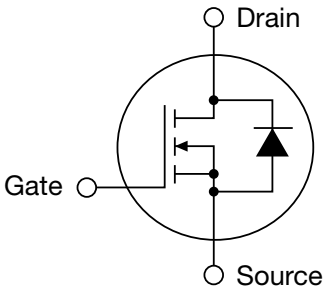
Package

TO-220FA

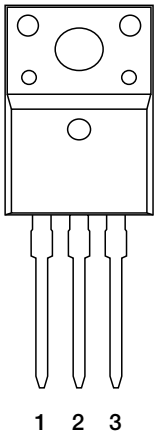
Applications

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	A
	Pulsed	I_{DP}	160	
Single Pulsed Avalanche Energy		E_{AS}	135	mJ
Power Dissipation (Tc=25°C)		P_D	41.7	W
Junction Temparature		T_j	150	°C
Storage Temparature		Tstg	−55~150	°C

Recommende 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)	VDD≒30V, VGS=10V, ID=30A, RL=47Ω		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			

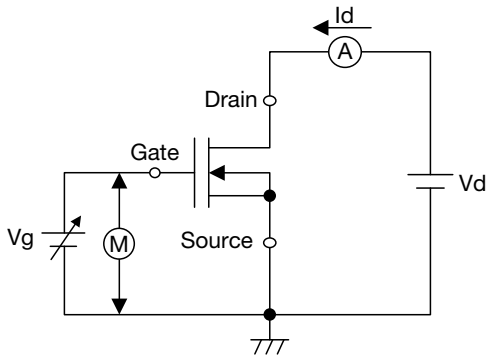
Source-Drain Diode Ratings

Item		Symbol	Measurement conditions	Min.	Typ.	Max.	Units	Measuring Circuit No.
Source Current	Continuous	IS				40	A	1-E
	Pulsed	ISP				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	

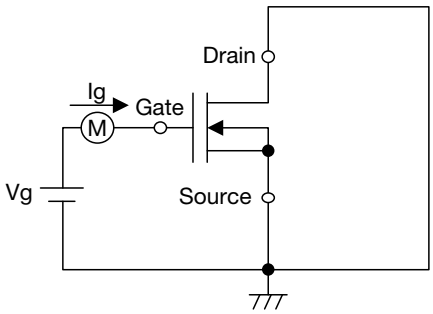
Measuring Circuit

(1) Static Characteristics

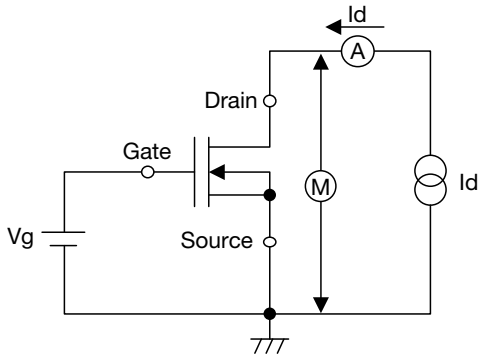
(A)



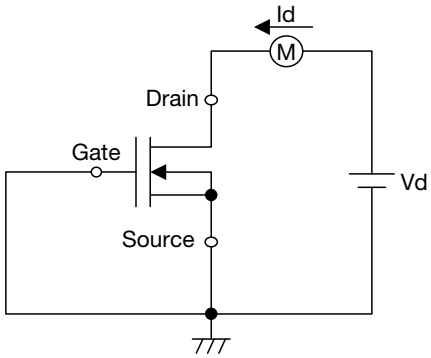
(D)



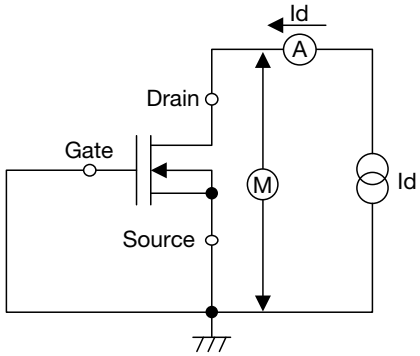
(B)



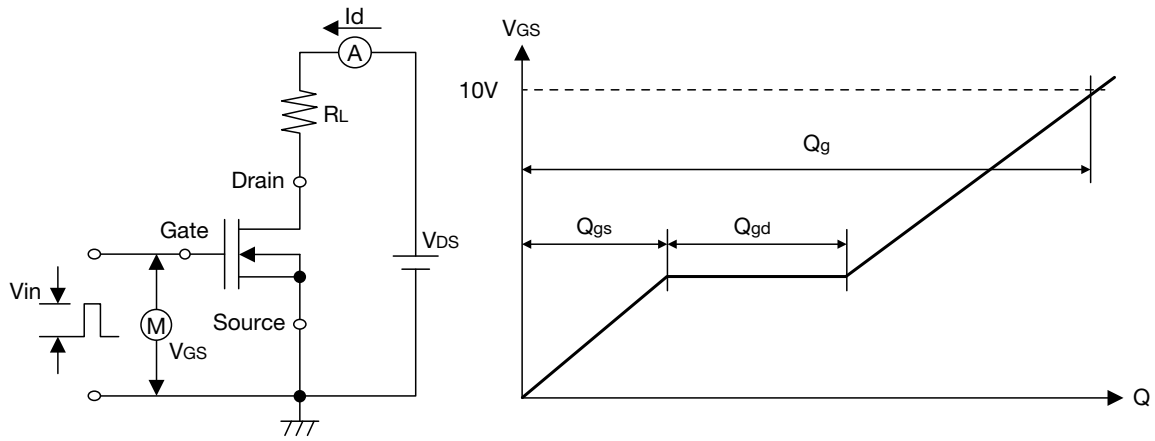
(E)



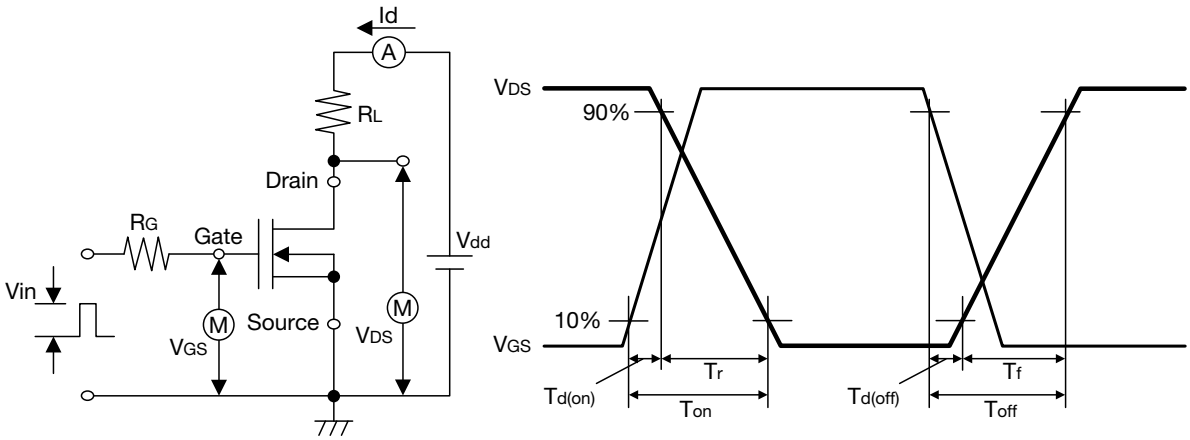
(C)



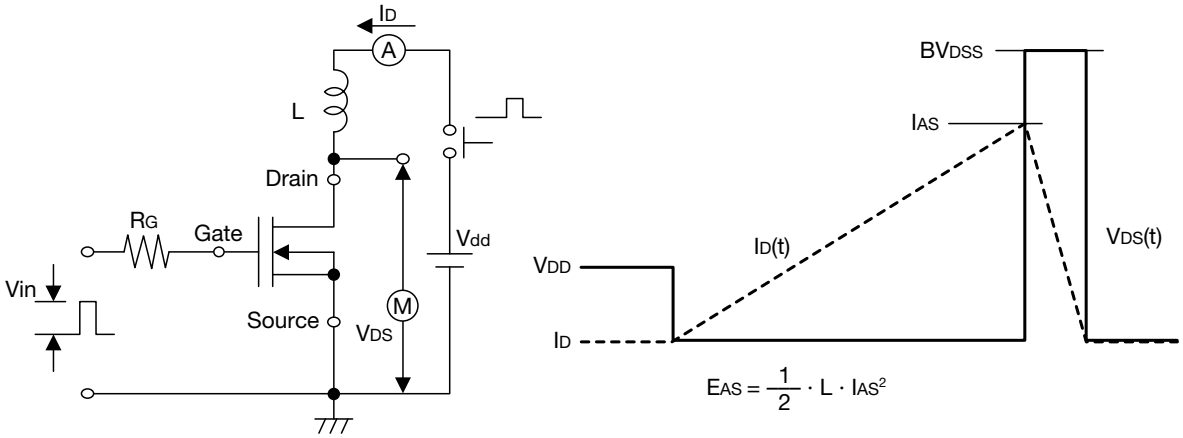
(2) Gate Charge Test



(3) Resistive Load Swithching Test



(4) Avaranche Energy Test



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

Fig.1 ID-VGS

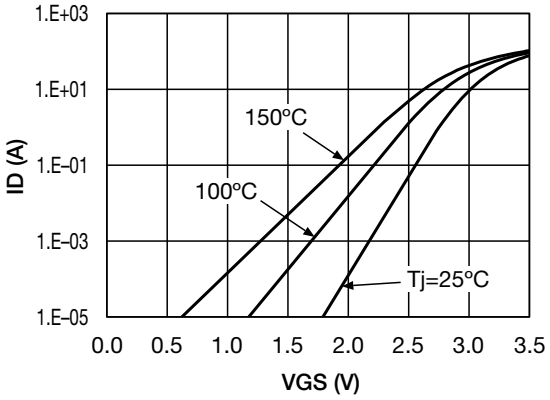


Fig.2 Vth-Tj

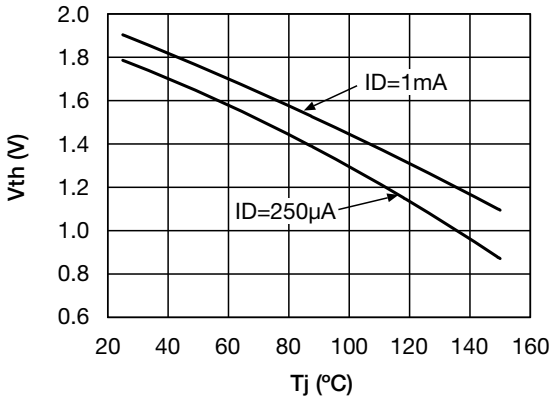


Fig.3 ID-VDS

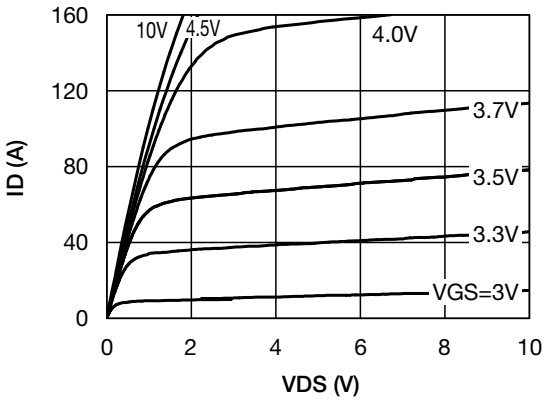


Fig.4 Ron-ID

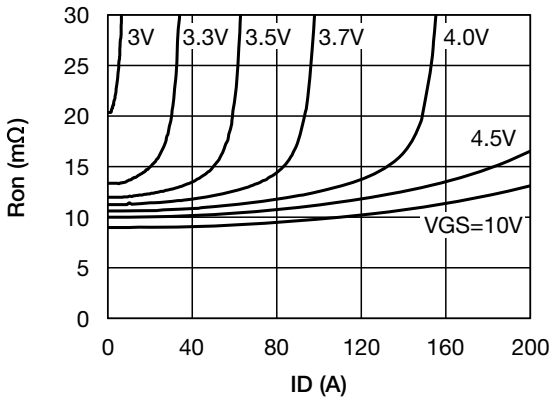


Fig.5 Ron-Tj

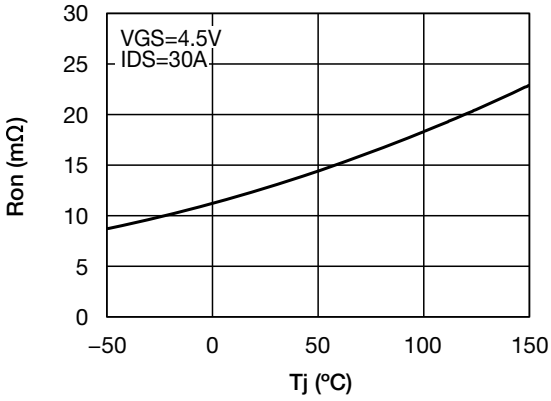


Fig.6 BVDSS-Tj

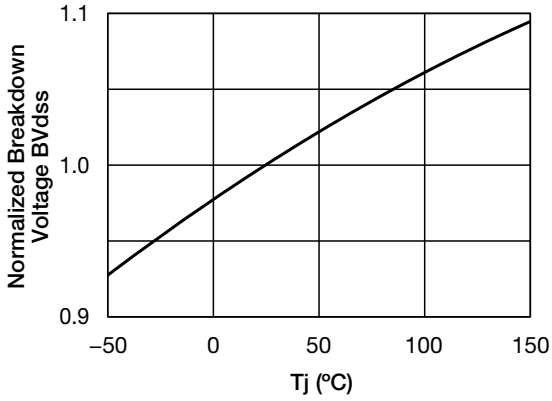


Fig.7 IS-VSD

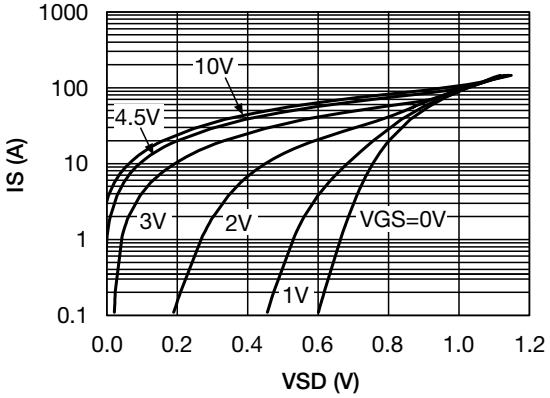


Fig.8 C-VDS

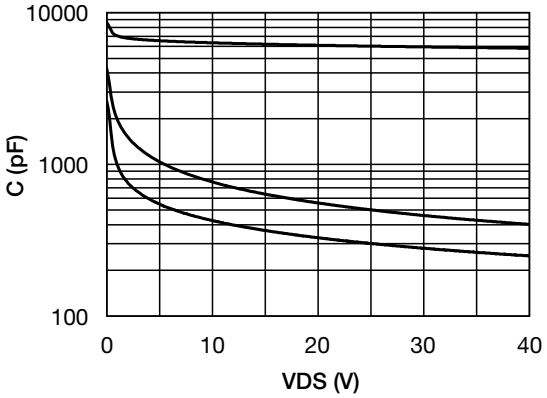


Fig.9 VGS-Q

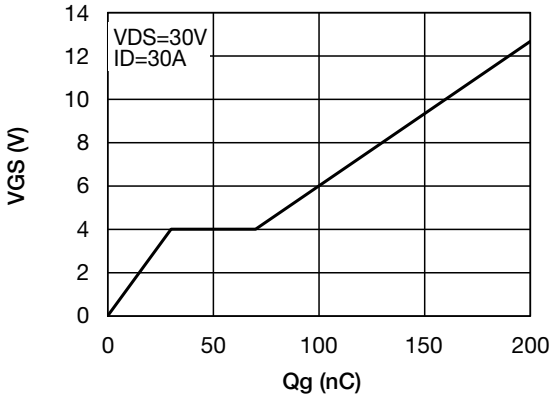


Fig.10 PD-Tc

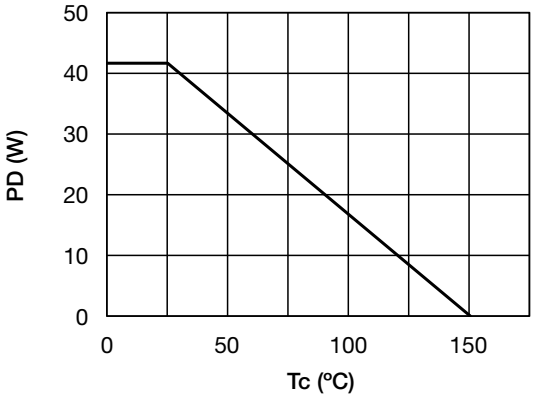


Fig.11 ID-Tc

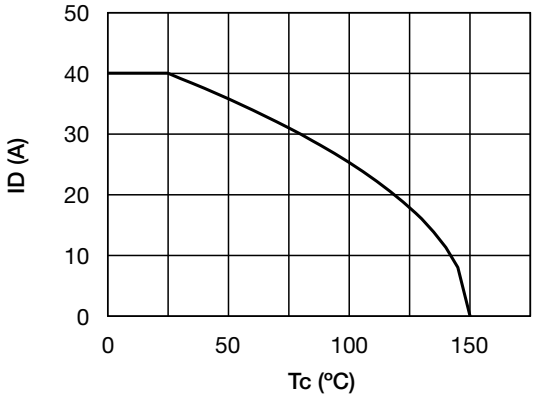


Fig.12 Transient Thermal Response Curve

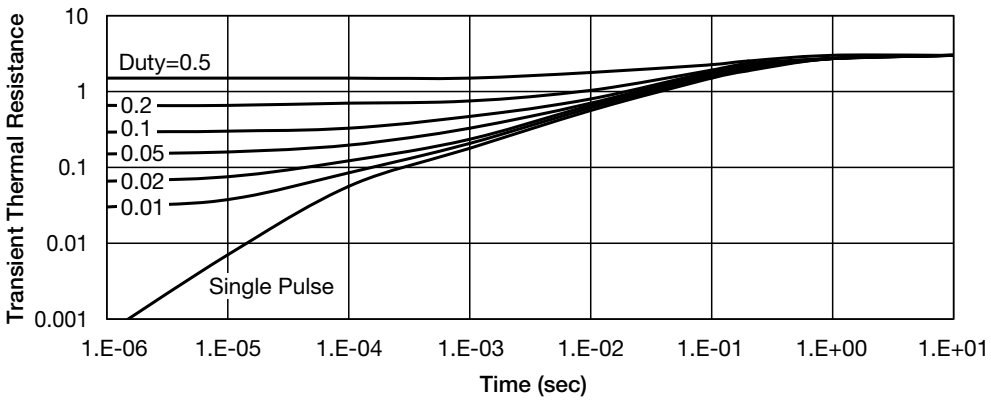


Fig.13 Safe Operation Area