

• General Description

The ZM020N04HP combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$.

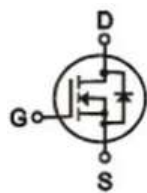
• Features

- Advance high cell density Trench technology
- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance

• Application

- Synchronous Rectification
- Power Management in Inverter System
- POL application
- BLDC Motor driver

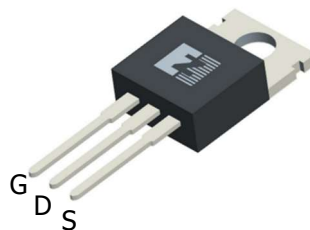
• Product Summary



$$V_{DS}=40V$$

$$R_{DS(ON)}=2.2m\Omega$$

$$I_D=180A$$



TO-220

• Ordering Information:

Part NO.	ZM020N04HP
Marking	ZM020N04H
Packing Information	Bulk Tube
Basic ordering unit (pcs)	1000

• Absolute Maximum Ratings ($T_C=25^{\circ}C$)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	$I_{D@TC=25^{\circ}C}$	180	A
	$I_{D@TC=75^{\circ}C}$	137	A
	$I_{D@TC=100^{\circ}C}$	113	A
Pulsed Drain Current ^①	I_{DM}	540	A
Total Power Dissipation($TC=25^{\circ}C$)	$P_{D@TC=25^{\circ}C}$	100	W
Total Power Dissipation($TA=25^{\circ}C$)	$P_{D@TA=25^{\circ}C}$	5	W
Operating Junction Temperature	T_J	150	$^{\circ}C$
Storage Temperature	T_{STG}	150	$^{\circ}C$
Single Pulse Avalanche Energy	E_{AS}	245	mJ
Avalanche Current	I_{AS}	70	A

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	1.25	$^{\circ}C/W$
Thermal resistance, junction - ambient	R_{thJA}	-	-	32	$^{\circ}C/W$
Soldering temperature, wave soldering for 10s	T_{sold}	-	-	265	$^{\circ}C$

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	40			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2.0		4.0	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=40V, V_{GS}=0V$			1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$			100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=70A$		2.2	3	m Ω
		$V_{GS}=4.5V, I_D=30A$		3	4	m Ω
Diode Forward Voltage	V_{FSD}	$I_{SD}=20A, V_{GS}=0V$			1.3	V

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	$V_{GS}=0V$	-	5580	-	pF
Output capacitance	C_{oss}	$V_{DS}=25V$	-	480	-	
Reverse transfer capacitance	C_{rss}	$f=1MHz$	-	275	-	

●Gate Charge characteristics($T_a=25^{\circ}C$)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	Q_g	$V_{DD}=20V$	-	70	-	nC
Gate - Source charge	Q_{gs}	$I_D=20A$	-	17	-	
Gate - Drain charge	Q_{gd}	$V_{GS}=10V$	-	12	-	

Note: ① Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$;

Fig.1 Gate-Charge Characteristics

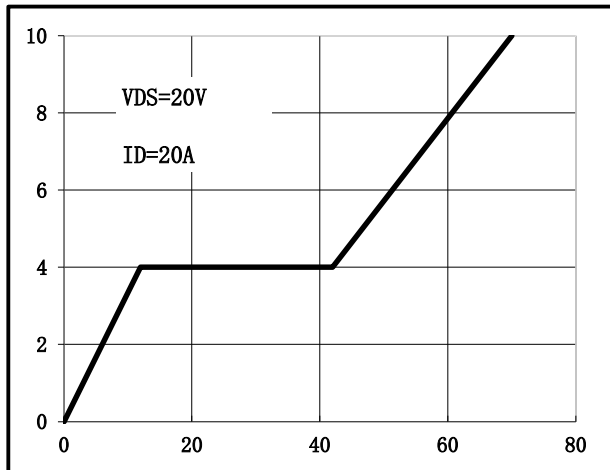


Fig.2 Capacitance Characteristics

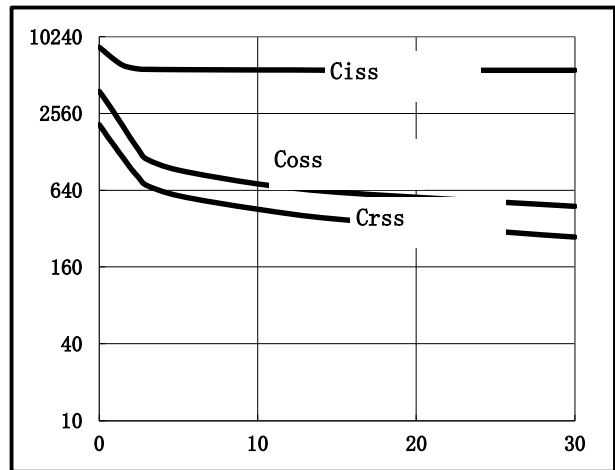


Fig.3 Power Dissipation

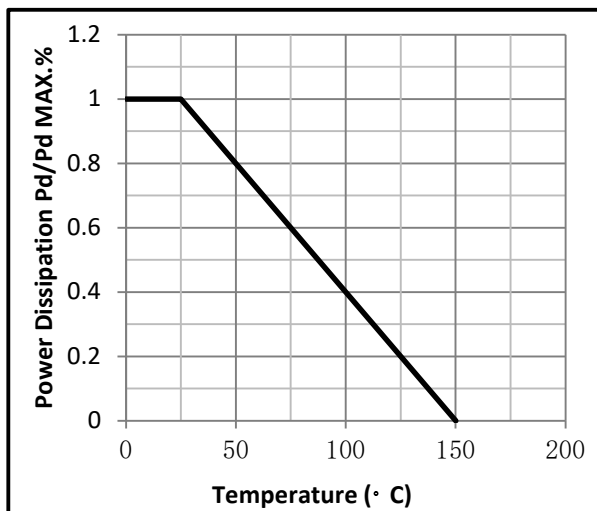


Fig.4 Typical output Characteristics

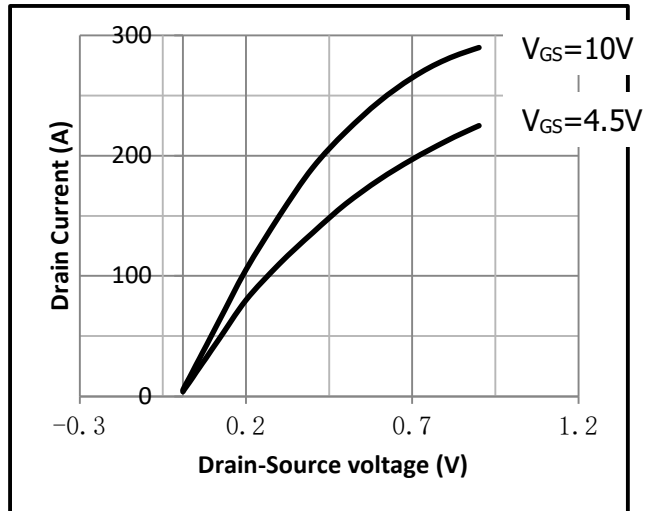


Fig.5 Threshold Voltage V.S Junction Temperature

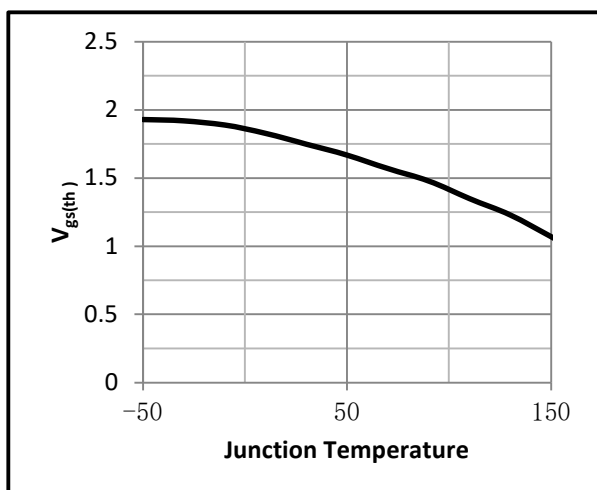


Fig.6 Resistance V.S Drain Current

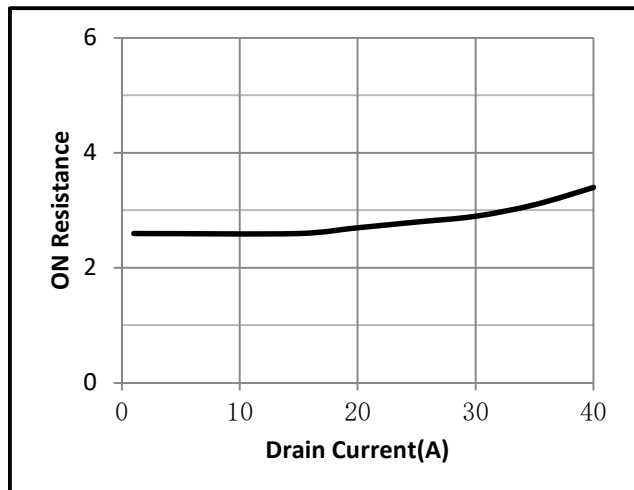


Fig.7 On-Resistance VS Gate Source Voltage

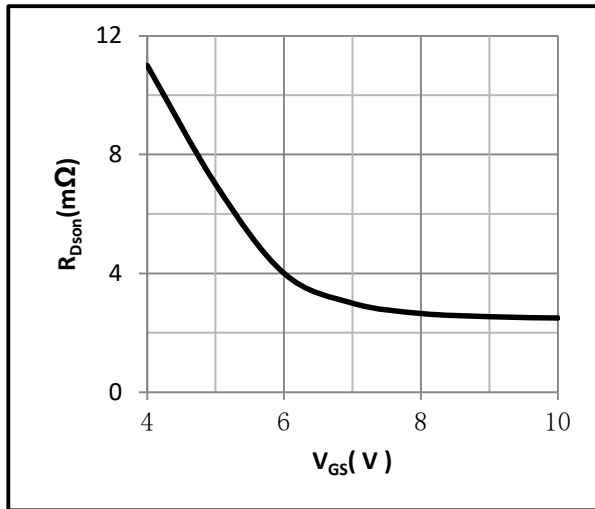


Fig.8 On-Resistance V.S Junction Temperature

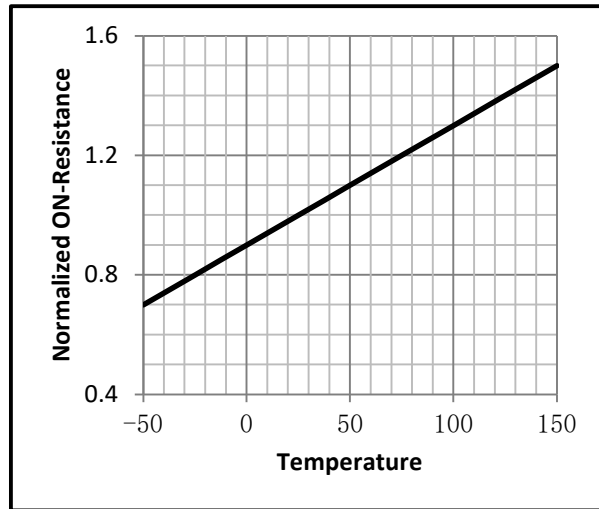


Fig.9 SOA Maximum Safe Operating Area

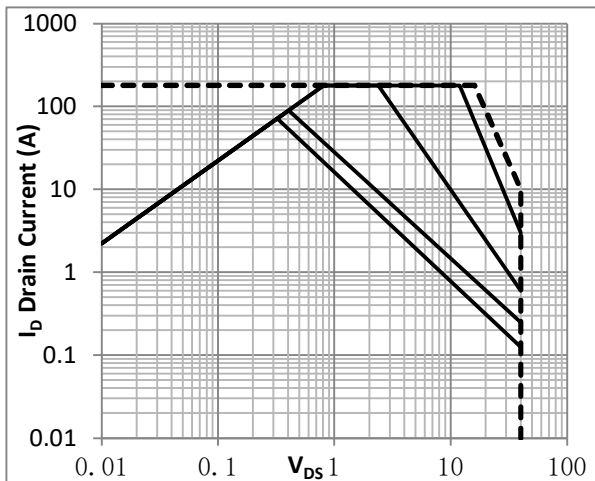


Fig.10 I_D -Junction Temperature

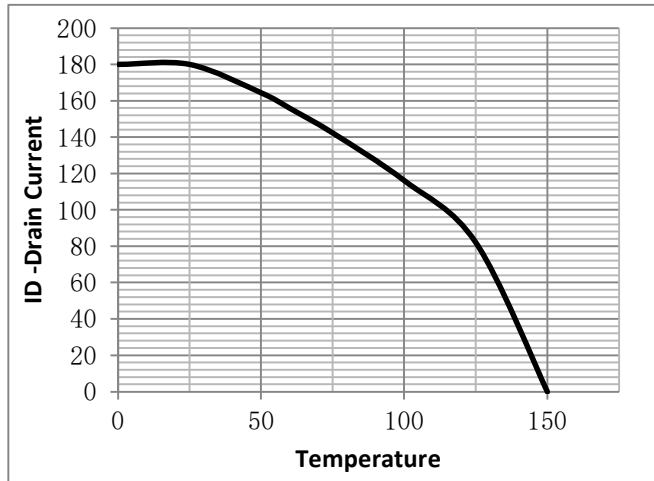


Fig.11 Gate Charge Measurement Circuit

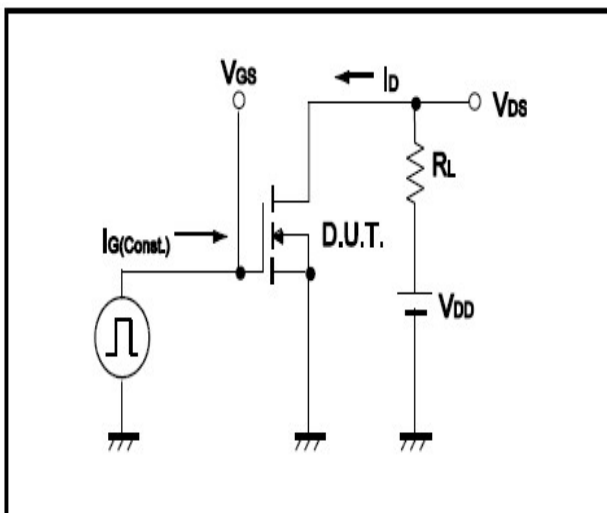


Fig.12 Gate Charge Waveform

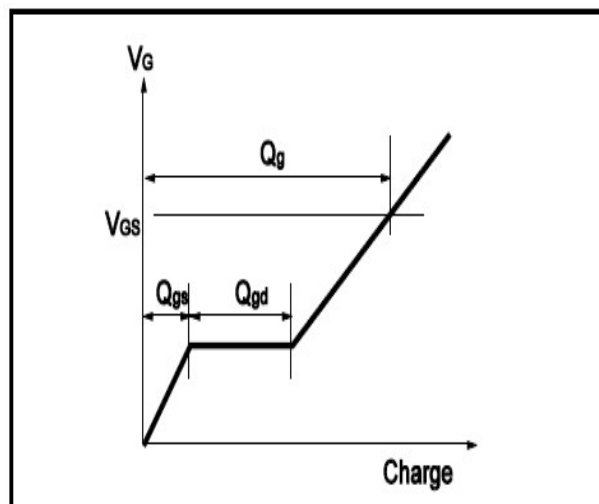


Fig.13 Resistive Switching Test Circuit

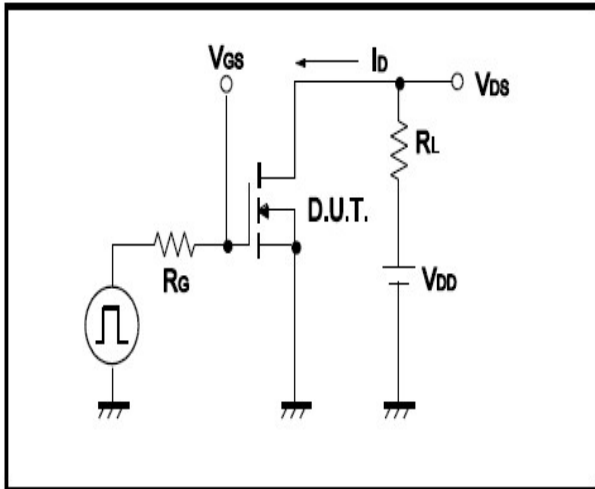
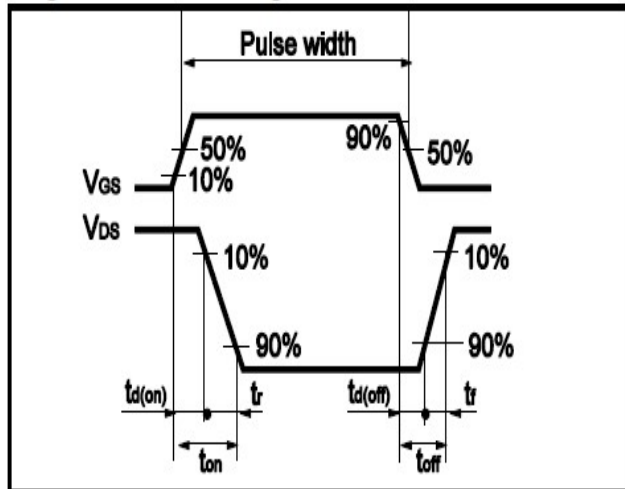


Fig.14 Resistive Switching Test Waveform



•Dimensions (TO-220)

Unit: mm

SYMBOL	min	nom	max	SYMBOL	min	nom	max
A	4.00		4.80	E	9.90		10.70
B	1.20		1.50	e		2.54	
B1	1.00		1.40	F	1.10		1.45
b1	0.65		1.00	L	12.50		14.50
c	0.35		0.75	L1	3.00	3.50	4.00
D	15.00		16.50	Q	2.50		3.00
D1	5.90		6.90	Q1	2.00		3.00
				ΦP	3.60		3.90

