N-CHANNEL ENHANCEMENT MODE POWER MOSFET

TF020N02N

● General Description

The TF020N02N combines advanced trench MOSFET technology with a low resistance package toprovide 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

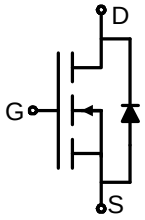
MB/VGA Vcore

SMPS 2nd Synchronous Rectifier

POL application

BLDC Motor driver

● Product Summary



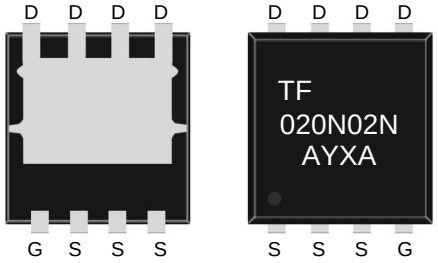
V_{DS} =20V I_D=130A

$R_{DSON(10\ V\ typ)}$=1.6mΩ

$R_{DSON(4.5V\ typ)}$=1.8mΩ

$R_{DSON(2.5V\ typ)}$=2.5mΩ

RoHS compliant



PDFNWB5x6-8L

●Ordering Information:

Part NO.	TF020N02N
Marking1	020N02N:TF020N02N
Marking2	TF:tuofeng; Y:year code; X:Week; AA:device code;
Basic ordering unit (pcs)	5000

●Absolute Maximum Ratings (Tj=25℃,unless otherwise notse)

Parameter	**Symbol**	Rating	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±12	V
Continuous Drain Current	$I_{D@}T_C$=25℃	130	A
	$I_{D@}T_C$=75℃	91	A
	$I_{D\ @}T_C$=100℃	78	A
Pulsed Drain Current ①	I_{DM}	450	A
Total Power Dissipation②	$P_D@T_C$=25℃	75	W
Total Power Dissipation	$P_D@T_A$=25℃	1.5	W
Operating Junction Temperature	T_J	-55 to 150	℃
Storage Temperature	T_{STG}	-55 to 150	℃

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case②	R_{thJC}	-	-	1.6	°C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	45	°C/W
Soldering temperature, wavesoldering for 8s	T_{sold}	-	-	265	°C

●Electronic Characteristics(Tj=25℃,unless otherwlse notse)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V, I_D =250uA	20			V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} =V_{DS}, I_D =250uA	0.5	0.9	1.3	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=20V, V_{GS} =0V			1.0	uA
Gate- Source Leakage Current	I_{GSS}	V_{GS}=±12V, V_{DS} =0V			±100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=20A		1.6	2.0	mΩ
		V_{GS}=4.5V, I_D=20A		1.8	2.5	mΩ
		V_{GS}=2.5V, I_D=20A		2.5	3.8	mΩ
Forward Transconductance	g_{FS}	V_{DS} =10V, I_D=20A		18		S
Source-drain voltage	V_{SD}	Is=20A		0.80	1.00	V

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	V_{DD} =10V f = 1MHz V_{GS} = 0V	-	6215	-	pF
Output capacitance	C_{oss}		-	824	-	
Reverse transfer capacitance	C_{rss}		-	723	-	

●Gate Charge characteristics(Tj=25℃,unless otherwise notse)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	Q_g	V_{DD} =10V I_D = 50A V_{GS} = 10V	-	270	-	nC
Gate - Source charge	Q_{gs}		-	15.0	-	
Gate - Drain charge	Q_{gd}		-	50.0	-	
Turn-ON Delay Time	$t_{d(on)}$	V_{DD} = 10V, I_D =50A, R_{GEN} =3Ω	-	21.0	-	nS
Rise Time	t_r		-	28.0	-	
Turn-OFF Delay Time	$t_{d(off)}$		-	31.0	-	
Fall Time	t_f		-	25.0	-	

Note:
① Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2% ;
② Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;

Fig.1 Gate-Charge Characteristics

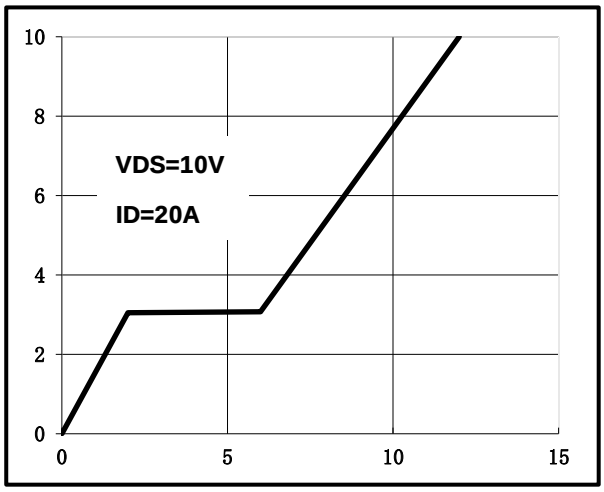


Fig.2 Capacitance Characteristics

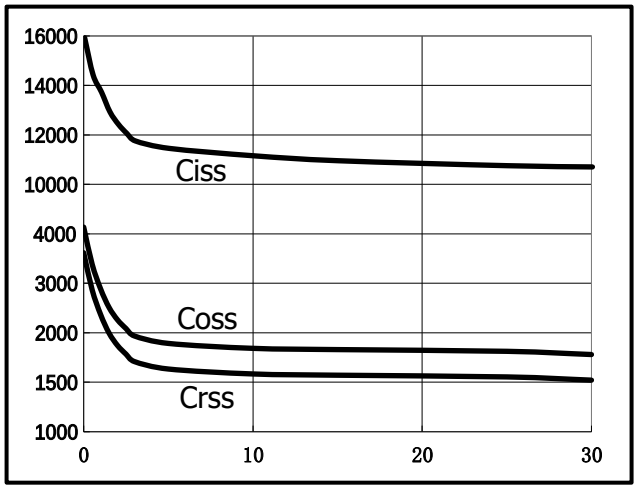


Fig.3 Power Dissipation Derating Curve

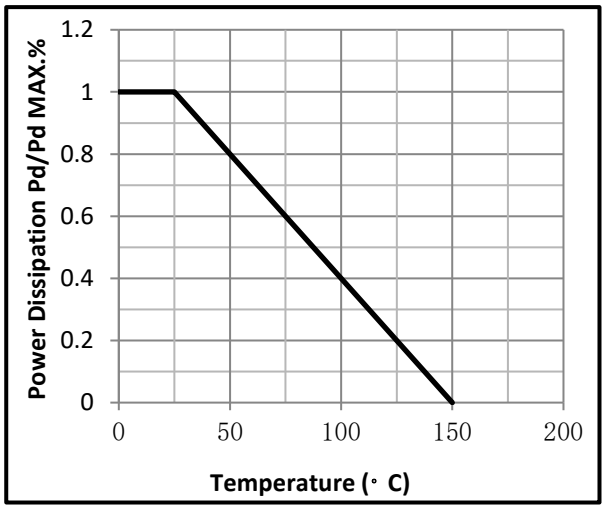


Fig.4 Typical output Characteristics

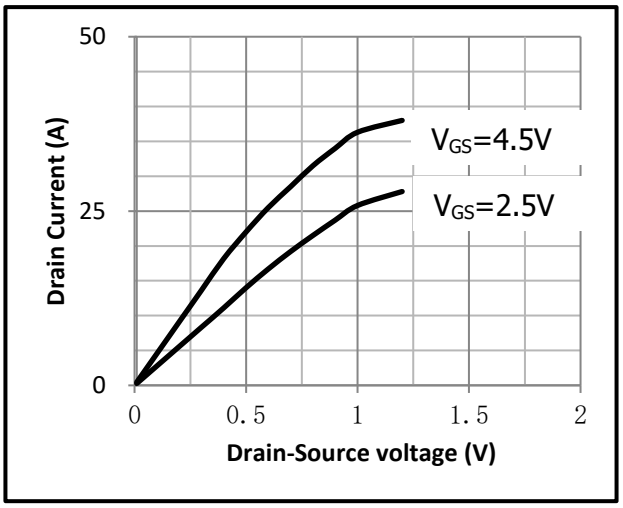


Fig.5 Threshold Voltage V.S Junction Temperature

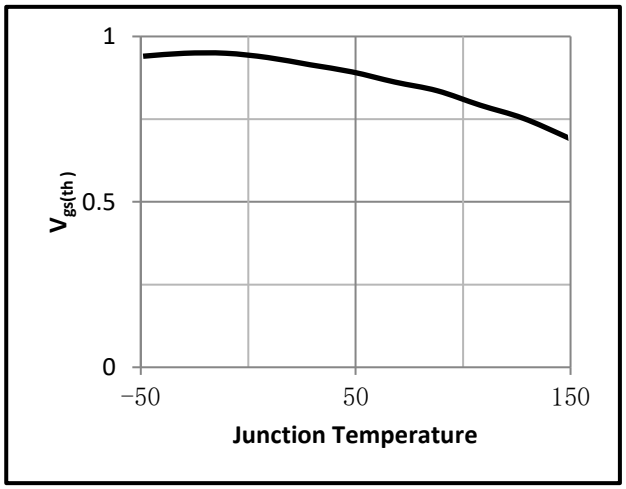


Fig.6 Resistance V.S Drain Current

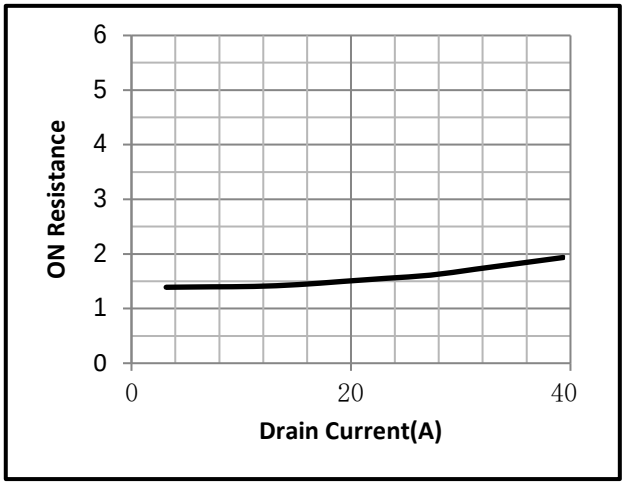


Fig.7 On-Resistance VS Gate Source Voltage

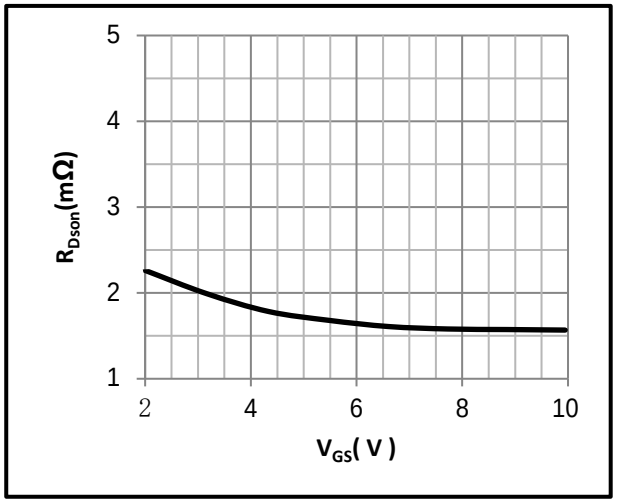


Fig.8 On-Resistance V.S Junction Temperature

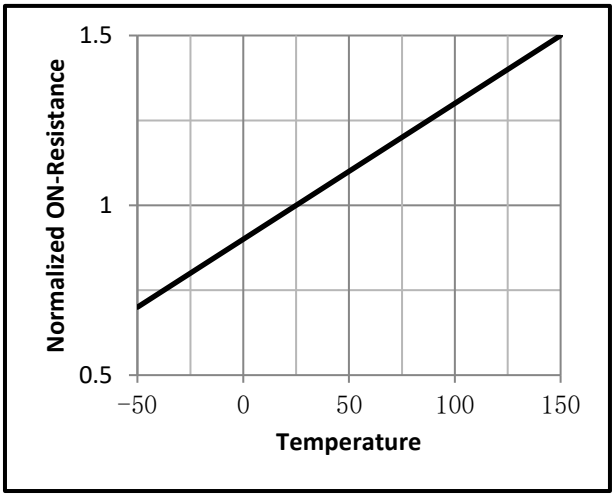


Fig.9 Switching Time Measurement Circuit

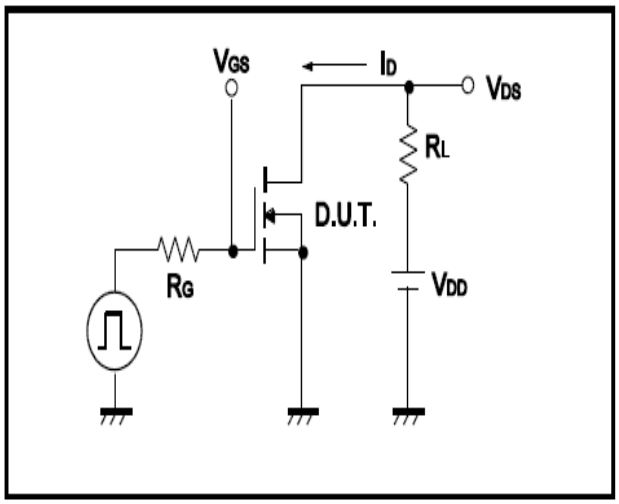


Fig.10 Gate Charge Waveform

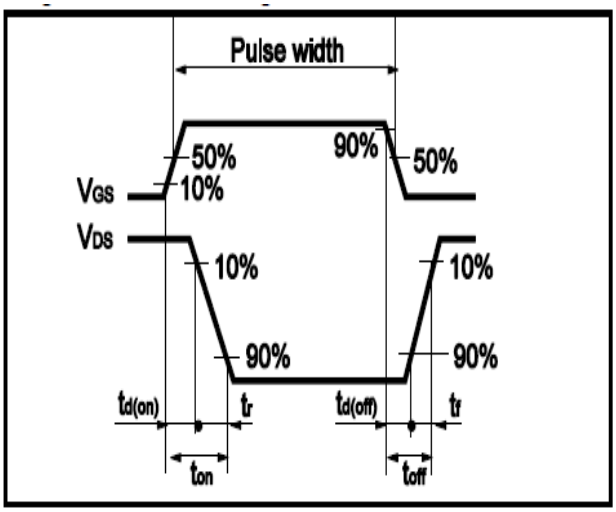


Fig.11 Avalanche Measurement Circuit

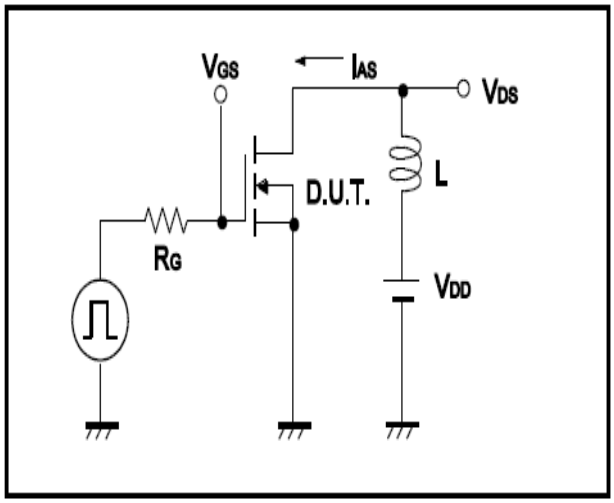
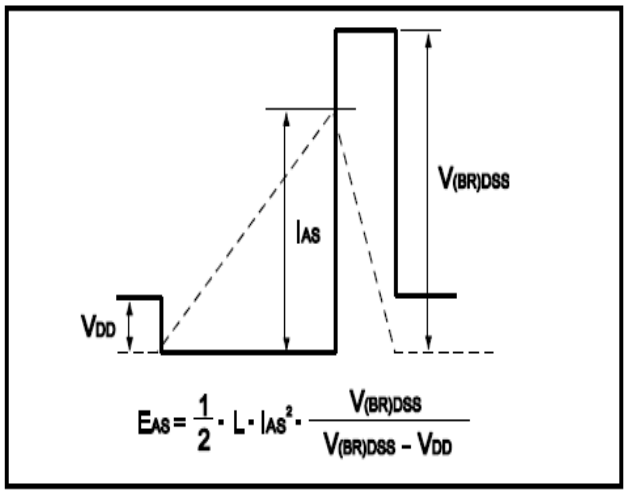
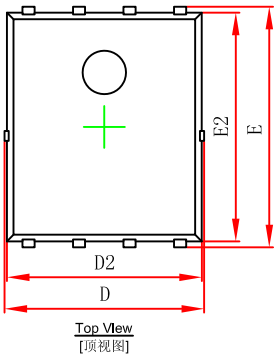
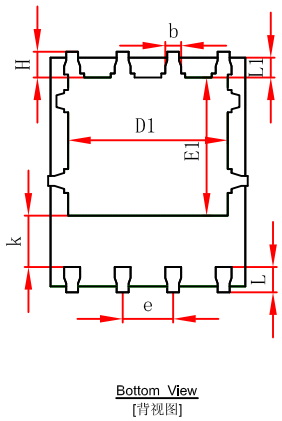


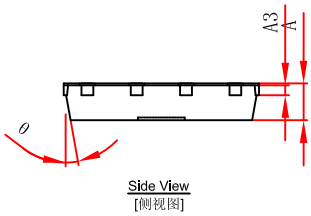
Fig.12 Avalanche Waveform



PDFNWB5x6-8L Package Outline Dimensions

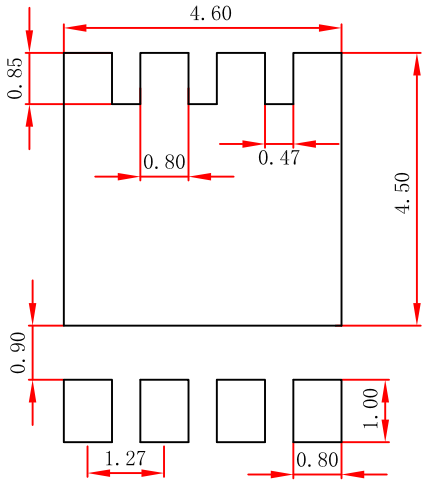






Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°

PDFNWB5x6-8L Suggested Pad Layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:±0.05mm.
3.The pad layout is for reference purposes only.