

General Description

The TF015N04NG uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

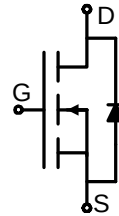
Features

- Advance device constructure
- Low $R_{DS(ON)}$ to minimize conduction loss
- Low Gate Charge for fast switching
- Low Thermal resistance

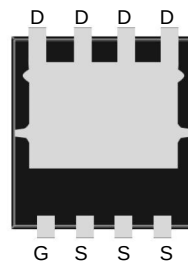
Application

Synchronous Rectification for AC-DC/DC-DC converter
Power Tools

Product Summary



V_{DS}	=40V	I_D	=164A
$R_{DS(ON)}$	(10V typ)	=	1.4mΩ
$R_{DS(ON)}$	(6.0V typ)	=	1.6mΩ
$R_{DS(ON)}$	(4.5V typ)	=	1.9mΩ



PDFNWB5x6-8L

Package Marking and Ordering Information:

Part NO.	TF015N04NG
Marking1	015N04NG
Marking2	TF:tuofeng; AA:device code; Y:year code; X:Week
MOQ	5000

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

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	$I_{D@TC=25^\circ\text{C}}$	164	A
	$I_{D@TC=75^\circ\text{C}}$	115	A
	$I_{D@TC=100^\circ\text{C}}$	99	A
Pulsed Drain Current ^①	I_{DM}	500	A
Total Power Dissipation	$P_D@TC=25^\circ\text{C}$	98	W
Total Power Dissipation	$P_D@TA=25^\circ\text{C}$	2.0	W
Operating Junction Temperature	T_J	-55 to 150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55 to 150	$^\circ\text{C}$
Single Pulse Avalanche Energy	E_{AS}	350	mJ

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	1.7	$^{\circ}C/W$
Thermal resistance, junction - ambient	R_{thJA}	-	-	47	$^{\circ}C/W$
Soldering temperature, wavesoldering for 8 s	T_{sold}	-	-	260	$^{\circ}C$

●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	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.10	1.55	2.30	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=38V, V_{GS}=0V$	-	-	1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=30A$	-	1.4	1.8	m Ω
		$V_{GS}=6.0V, I_D=30A$	-	1.6	2.3	m Ω
		$V_{GS}=4.5V, I_D=20A$	-	1.9	3.5	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=25V, I_D=30A$	-	26	-	S
Source-drain voltage	V_{SD}	$I_S=30A$	-	-	1.2	V

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	$f=1MHz$ $V_{DS}=20V$ $V_{GS}=0V$	-	3565	-	pF
Output capacitance	C_{oss}		-	1712	-	
Reverse transfer capacitance	C_{rss}		-	108.0	-	

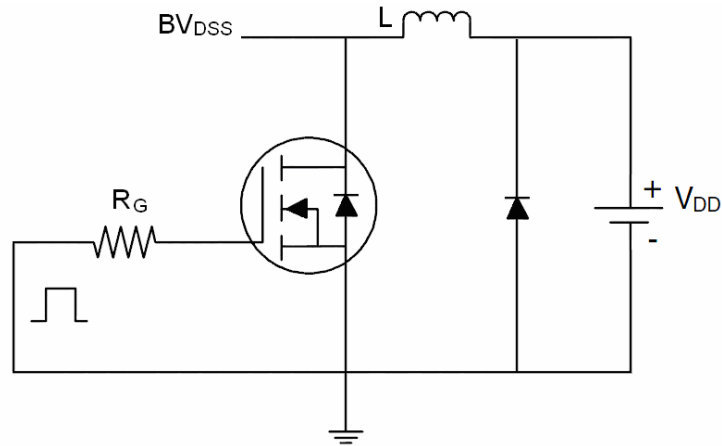
●Gate Charge characteristics($T_a=25^{\circ}C$)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Gate Resistance	R_g	$f=1MHz$		1.9		Ω
Total gate charge	Q_g	$V_{DD}=20V$ $I_D=20A$ $V_{GS}=10V$	-	51.8	-	nC
Gate - Source charge	Q_{gs}		-	10.0	-	
Gate - Drain charge	Q_{gd}		-	7.80	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=20V$ $R_G=3\Omega, R_L=1\Omega$		15.2		ns
Turn-ON Rise time	t_r			7.60		ns
Turn-Off Delay time	$t_{D(off)}$			48.4		ns
Turn-Off Fall time	t_f			13.6		ns
Reverse Recovery Time	t_{rr}	$V_{GS}=0V, I_S=I_f$ $dI_S/dt=100A/\mu s$		43.8		ns
Reverse Recovery Charge	Q_{rr}			32.6		nC

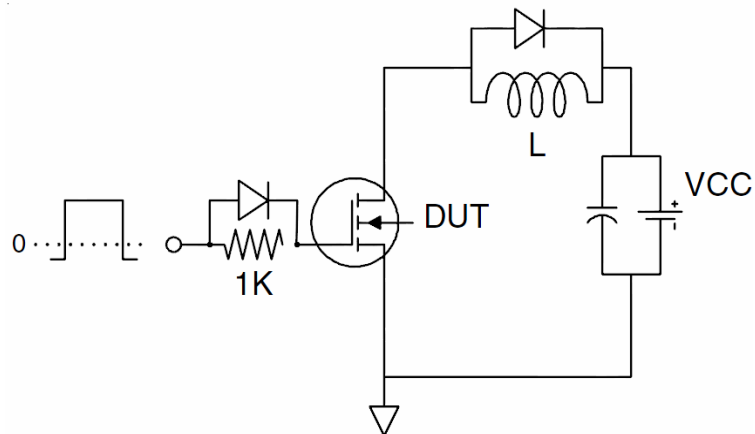
Note: ① Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$;

Test Circuit

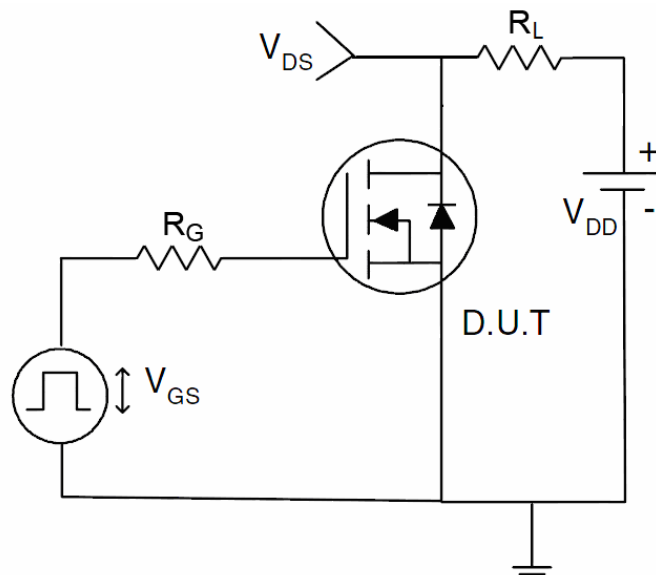
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical And Thermal Characteristics (Curves)

Figure 1. Output Characteristics

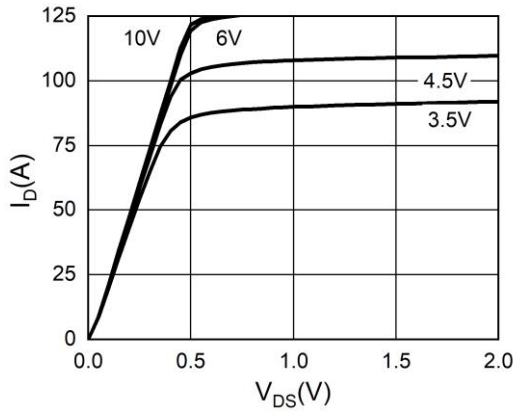


Figure 2. Transfer Characteristics

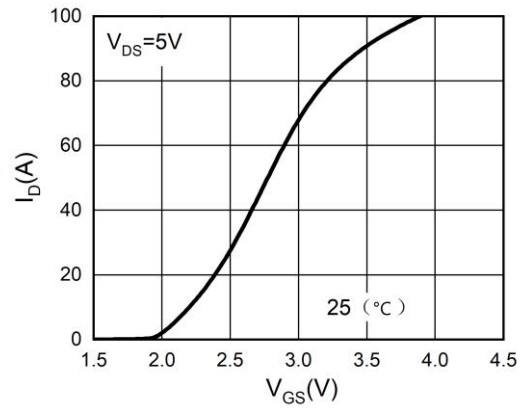


Figure 3. Power Dissipation

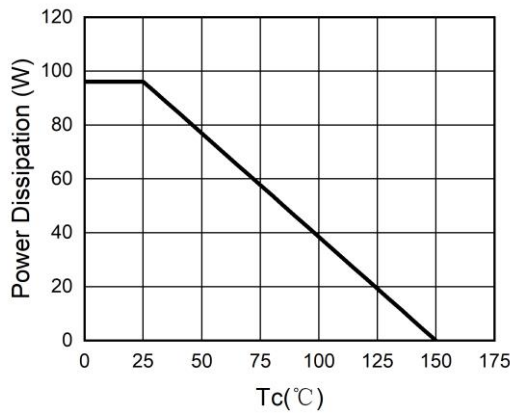


Figure 4. Drain Current

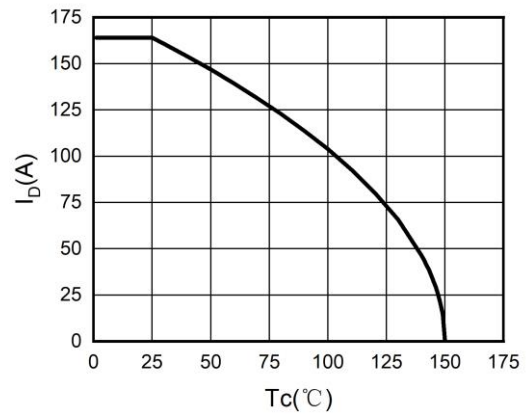


Figure 5. BV_{DSS} vs Junction Temperature

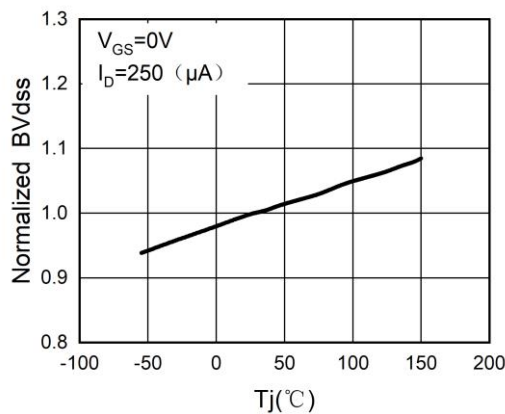
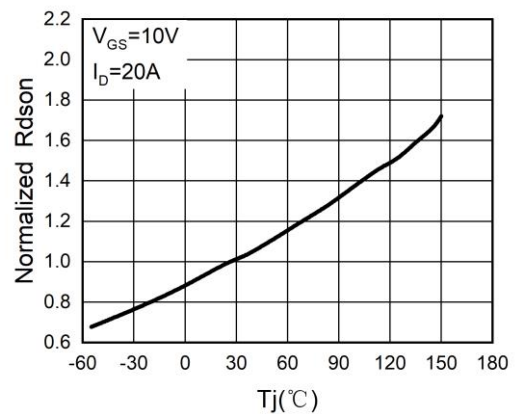
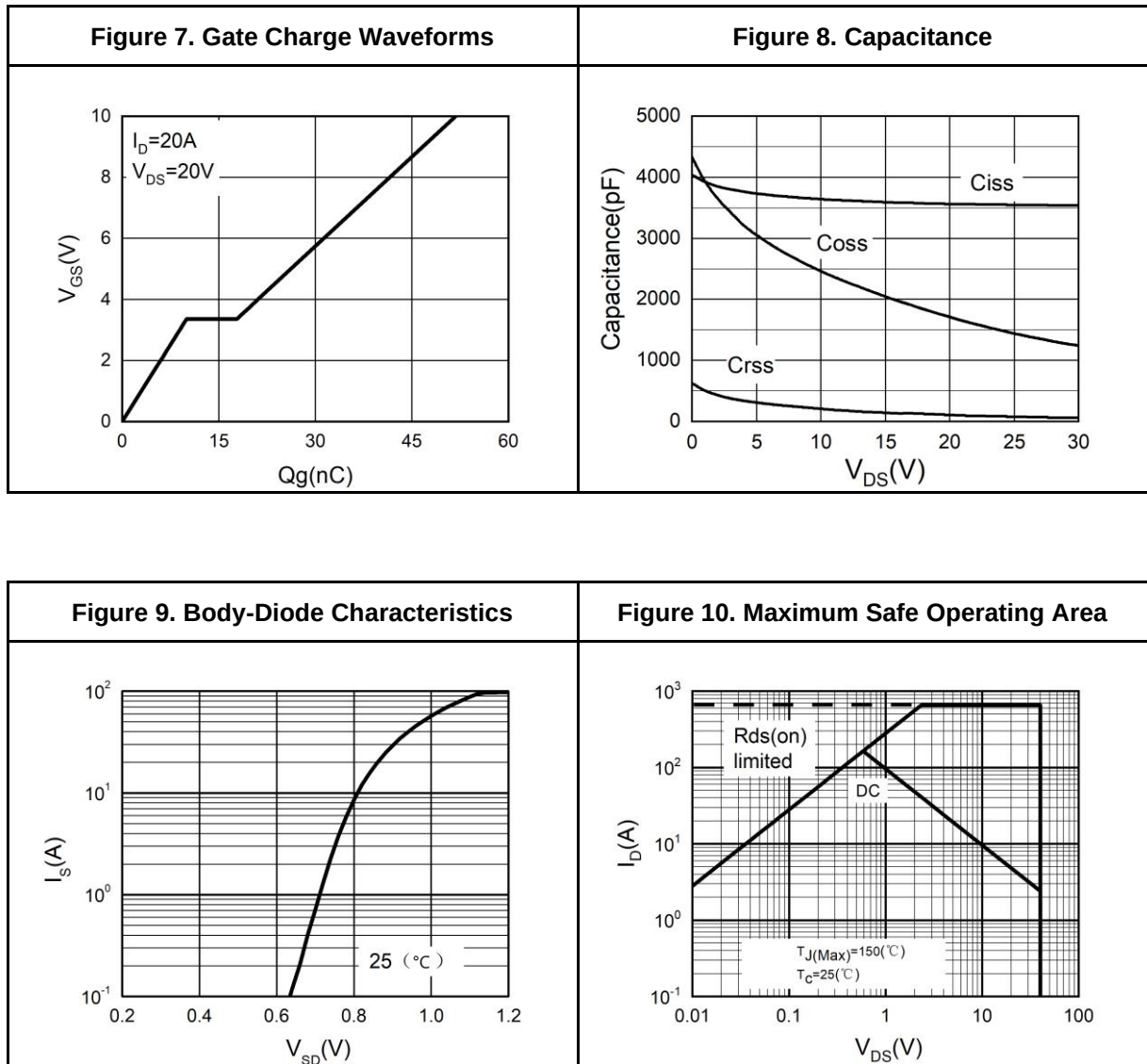


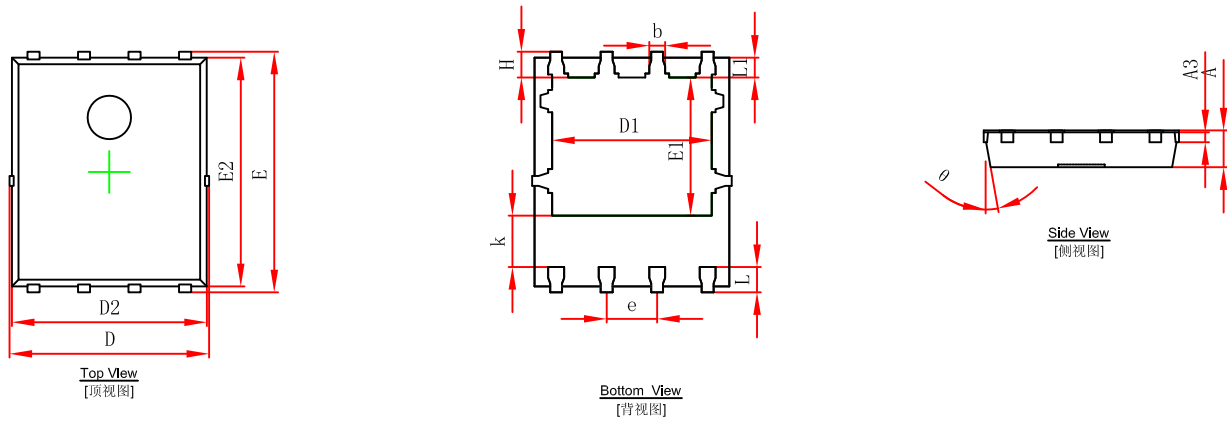
Figure 6. $R_{DS(ON)}$ vs Junction Temperature



Typical Electrical And Thermal Characteristics (Curves)

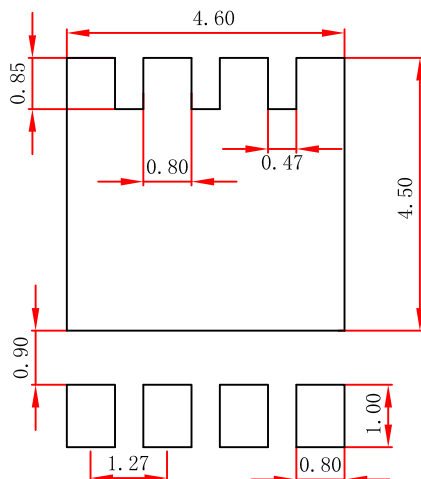


PDFNWB5x6-8L Package Outline Dimensions



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: $\pm 0.05\text{mm}$.
 3. The pad layout is for reference purposes only.