N-CHANNEL ENHANCEMENT MODE POWER MOSFET

SGT MOS、低内阻、低结电容开关损耗小

TF023N04NG

● General Description

The TF023N04NG uses advanced trench technology and design to provide excellent RDS(ON) withlowgate charge. It can be used in a wide variety ofapplications.

● Features

Advance device constructure

Low $R_{DS(ON)}$ to minimize conduction loss

Low Gate Charge for fast switching

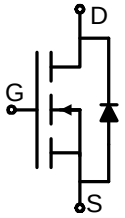
Low Thermal resistance

●Application

Synchronous Rectification for AC-DC/DC-DC converter

Power Tools

● Product Summary

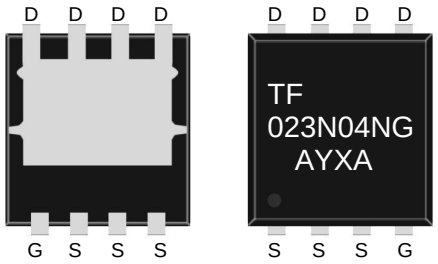


V_{DS} =40V I_D=110A

$R_{DSON(10V\ typ)}$ =2.3mΩ

$R_{DSON(4.5V\ typ)}$ =3.0mΩ

RoHS compliant



PDFNWB5x6-8L

●Package Marking and Ordering Information:

Part NO.	TF023N04NG
Marking1	023N04NG
Marking2	TF:tuofeng; AA:device code; Y:year code; X:Week
MOQ	5000

●Absolute Maximum Ratings (T_C =25℃)

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℃	110	A
	$I_{D@}$TC=75℃	85	A
	$I_{D@}$TC=100℃	65	A
Pulsed Drain Current ①	I_{DM}	230	A
Total Power Dissipation	P_D@TC=25℃	65	W
Total Power Dissipation	P_D@TA=25℃	3.0	W
Operating Junction Temperature	T_J	-55 to 150	℃
Storage Temperature	T_{STG}	-55 to 150	℃
Single Pulse Avalanche Energy	E_{AS}	105	mJ

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	1.65	°C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	40	°C/W
Soldering temperature, wavesoldering for 8 s	T_{sold}	-	-	265	°C

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V,I_D =250uA	40	-	-	V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} =V_{DS}, I_D =250uA	1.1	1.5	2.1	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=40 V_{GS} =0V	-	-	1.0	uA
Gate- Source Leakage Current	I_{GSS}	V_{GS}=±20V ,V_{DS} =0V	-	-	±100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=20A	-	2.3	2.8	mΩ
		V_{GS}=4.5V, I_D=20A	-	3.0	3.8	mΩ
Forward Transconductance	g_{FS}	V_{DS} =25V, I_D=20A	-	42	-	S
Source-drain voltage	V_{SD}	Is=20A	-	-	1.2	V

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	Ciss	f = 1MHz V_{DS}=20V V_{GS} = 0V	-	2800	-	pF
Output capacitance	Coss		-	1070	-	
Reverse transfer capacitance	Crss		-	110	-	

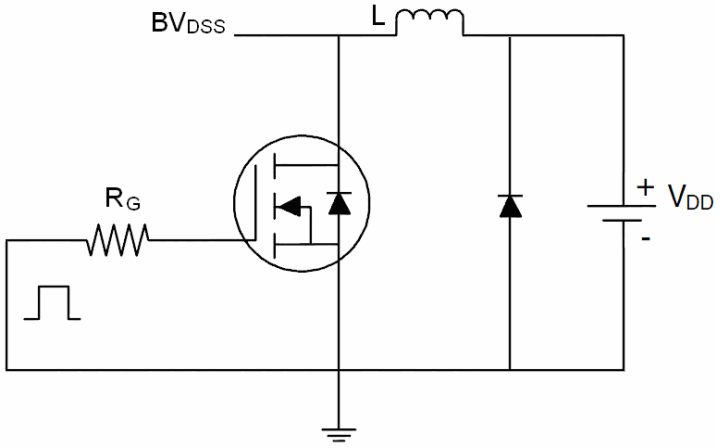
●Gate Charge characteristics(T_a = 25℃)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Gate Risistance	R_g	f = 1MHz		1.7		Ω
Total gate charge	Qg	V_{DD} = 20V I_D = 20A V_{GS} = 10V	-	46.0	-	nC
Gate - Source charge	Qgs		-	8.7	-	
Gate - Drain charge	Qgd		-	5.4	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=10V ,V_{DS}=20V R_G =3.0Ω,I_D =20A		4.00		ns
Turn-ON Rise time	t_r			5.00		ns
Turn-Off Delay time	$t_{D(off)}$			35.0		ns
Turn-Off Fall time	t_f			11.0		ns
Reverse Recovery Time	trr	V_{GS} = 0V, Is = 20A dIS/dt = 100A/μs		43.0		ns
Reverse Recovery Charge	Qrr			53.0		nC

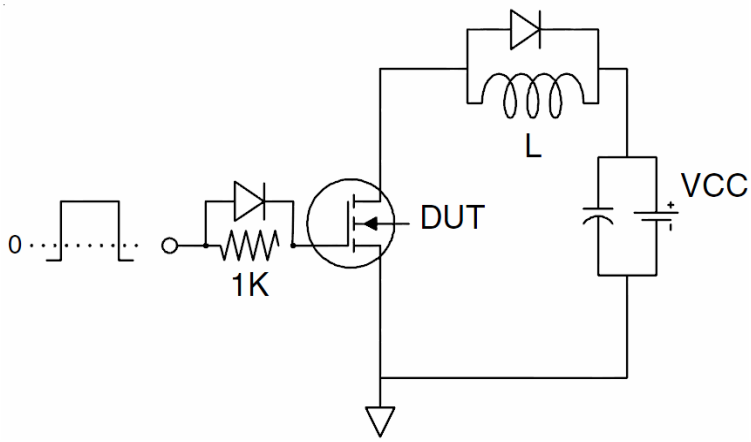
Note: ① Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2% ;

Test Circuit

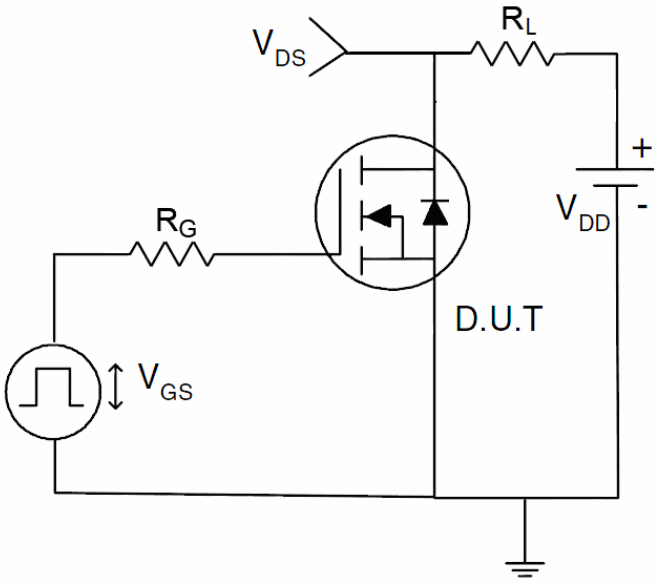
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics

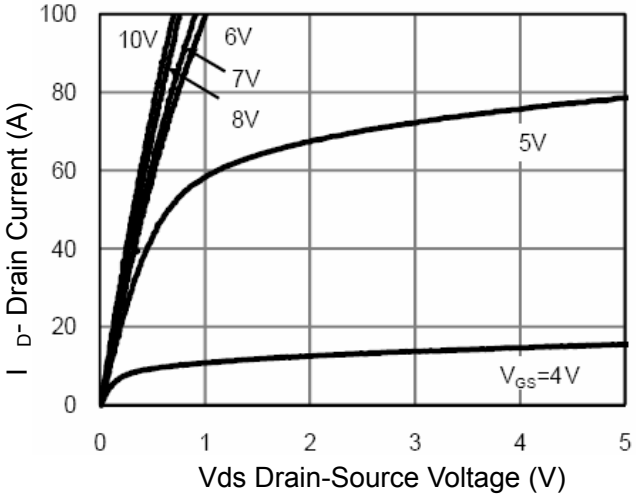


Figure 1 Output Characteristics

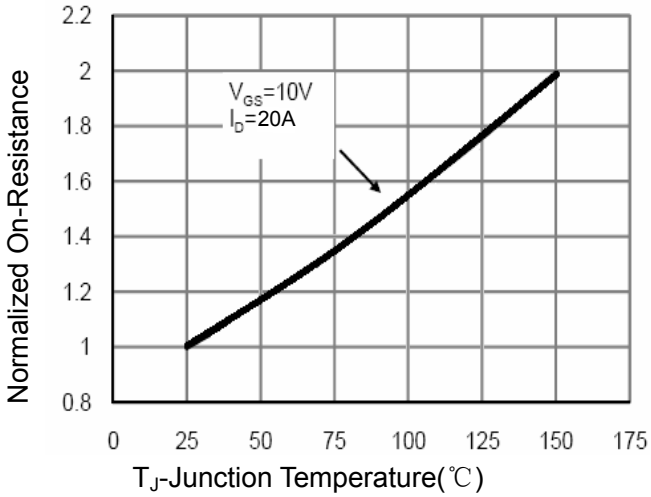


Figure 4 Rdson-JunctionTemperature

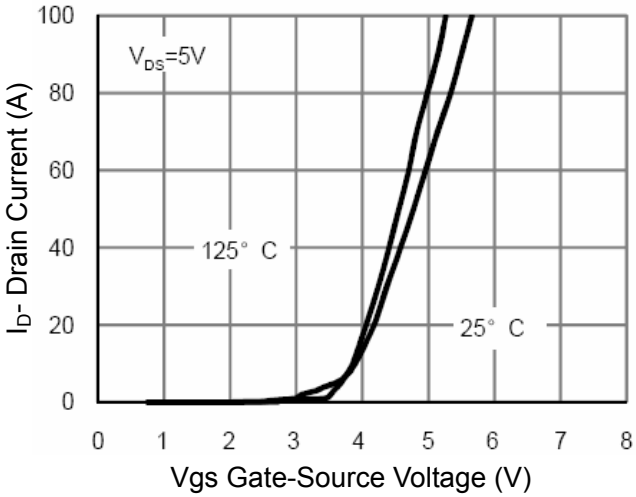


Figure 2 Transfer Characteristics

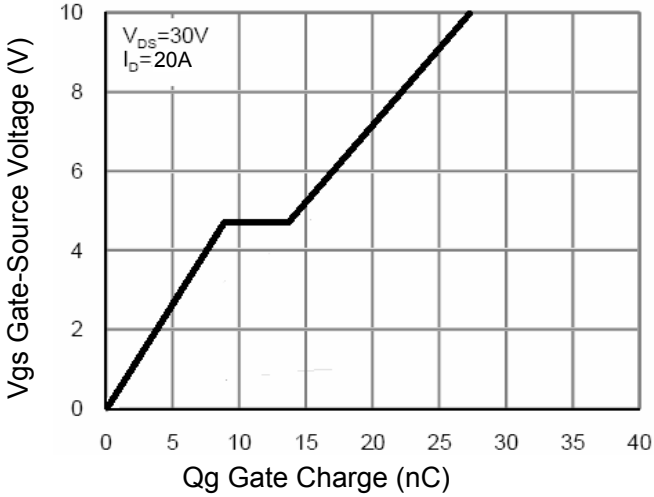


Figure 5 Gate Charge

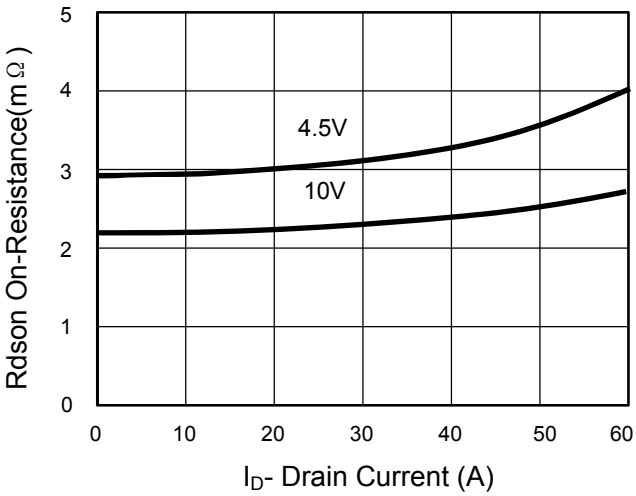


Figure 3 Rdson- Drain Current

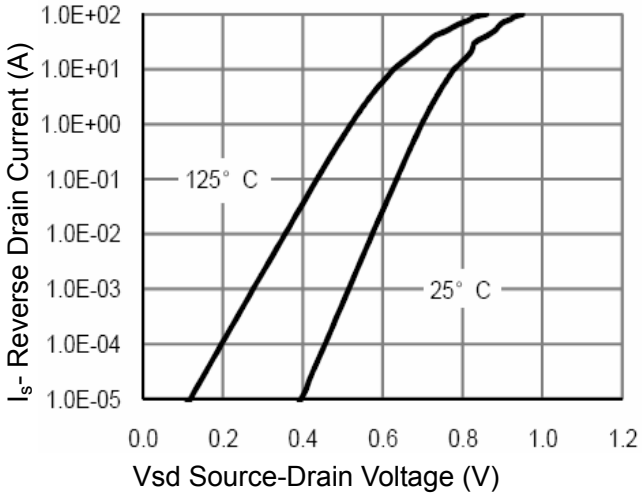


Figure 6 Source- Drain Diode Forward

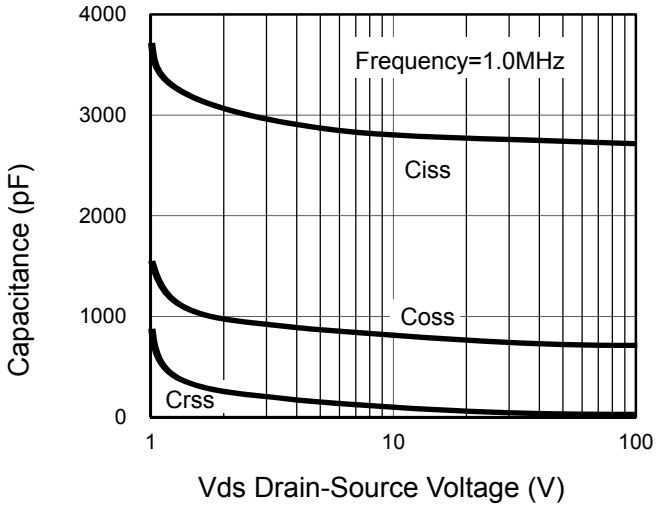


Figure 7 Capacitance vs Vds

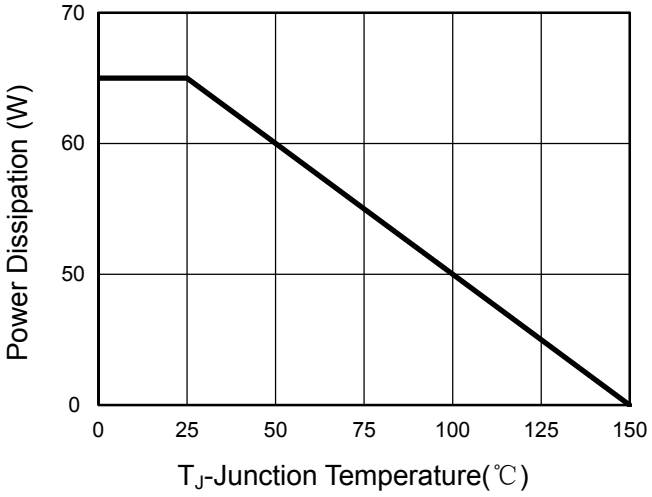


Figure 9 Power De-rating

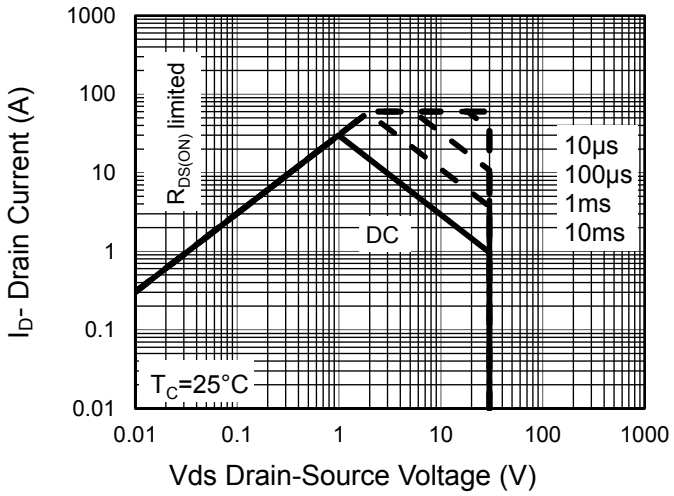


Figure 8 Safe Operation Area

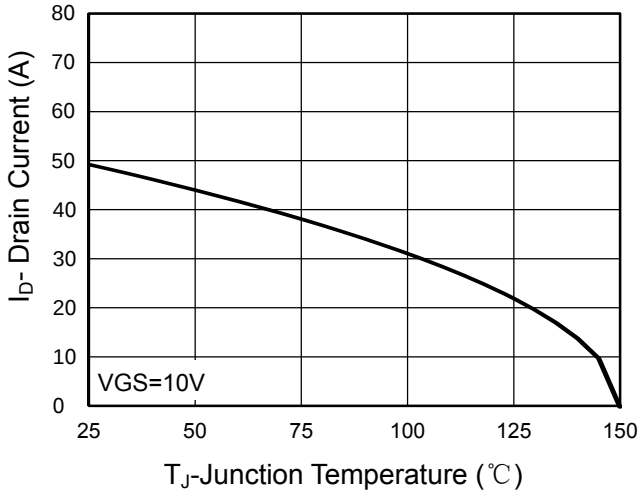


Figure 10 Current De-rating

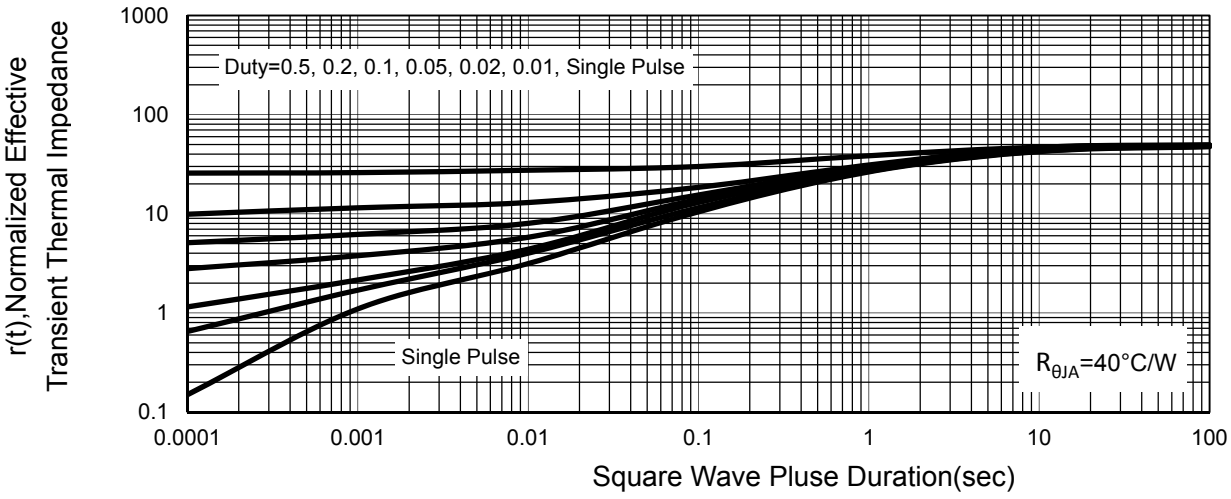
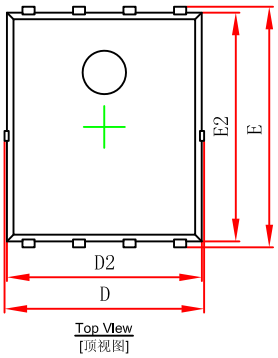
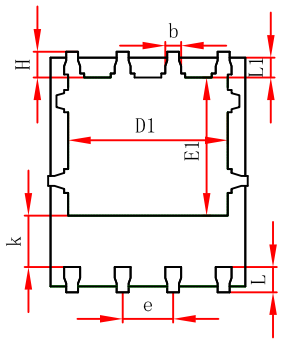


Figure 11 Normalized Maximum Transient Thermal Impedance

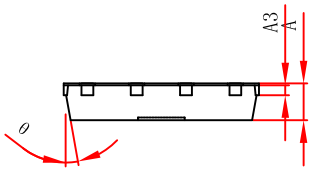
PDFNWB5x6-8L Package Outline Dimensions



Top View
[顶视图]



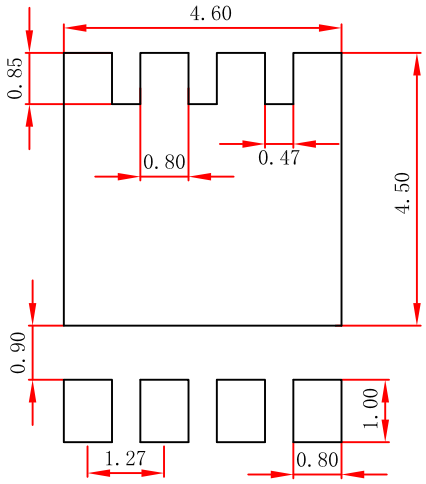
Bottom View
[背视图]



Side View
[侧视图]

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.