● General Description

The TF012N04NGC combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$ .This device is ideal for load switch and battery protection applications.

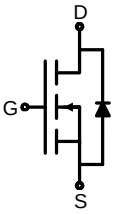
● Features

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

●Application

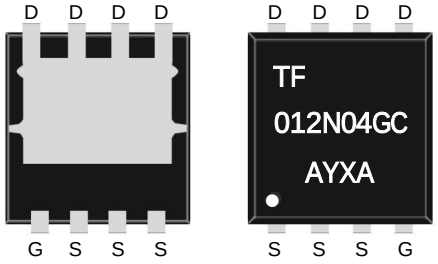
MB/VGA Vcore
SMPS 2nd Synchronous Rectifier
POL application
BLDC Motor driver

● Product Summary



V_{DS} =40V I_D=214A
$R_{DSON(10V\ typ)}$ =1.1mΩ
$R_{DSON(4.5V\ typ)}$ =1.7mΩ

RoHS compliant



PDFN5x6-8L-Clip

●Ordering Information:

Part NO.	TF012N04NGC
Marking 1	012N04GC : TF012N04NGC
Marking 2	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	$I_{D@}T_C$=25℃	214	A
	$I_{D@}T_C$=75℃	150	A
	$I_{D\ @}T_C$=100℃	135	A
Pulsed Drain Current ①	I_{DM}	856	A
Total Power Dissipation	P_D@T_C=25℃	104	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	℃

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

Single Pulse Avalanche Energy	E_{AS}	490	mJ
Avalanche Current(L=0.1mH)	I_{AS} I_{AR}	50	A

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	1.2	°C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	45	°C/W
Soldering temperature, wave soldering for 8s	T_{sold}	-	-	265	°C

●Electronic Characteristics(T_a = 25℃)

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	1.2	1.7	2.4	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=45V, 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		1.1	1.4	mΩ
		V_{GS}=4.5V, I_D=15A		1.7	2.2	mΩ
Forward Transconductance	g_{FS}	V_{DS} =10V, I_D=20A		56		S
Source-drain voltage	V_{SD}	Is=20A			1.20	V

●Electronic Characteristics(T_a = 25℃)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	Ciss	Vds=20V,Vgs=0V f = 1MHz	-	3008	-	pF
Output capacitance	Coss		-	1635	-	
Reverse transfer capacitance	Crss		-	68.0	-	

●Gate Charge characteristics(T_a = 25℃)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Gate Risistance	R_g	f = 1MHz		0.9		Ω
Total gate charge	Qg	V_{DD} = 20V	-	44.0	-	nC
Gate - Source charge	Qgs	I_D = 20A	-	9.50	-	
Gate - Drain charge	Qgd	V_{GS} = 10V	-	6.70	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=10V ,V_{DS}=20V R_G =3.0Ω, I=20A		4.60		ns
Turn-ON Rise time	t_r			9.60		ns
Turn-Off Delay time	$t_{D(off)}$			31.0		ns
Turn-Off Fall time	t_f			14.0		ns

Typical Electrical and Thermal Characteristics

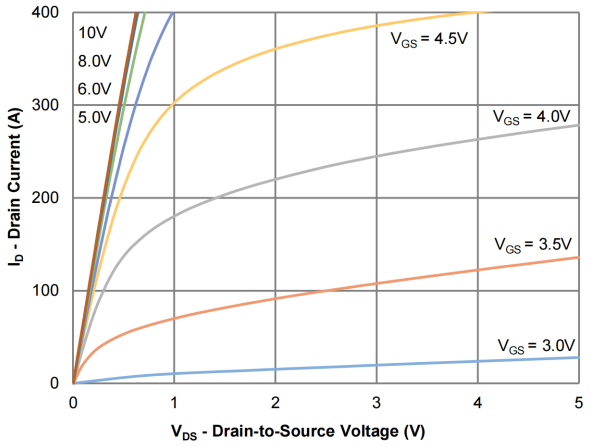


Figure 1: Output Characteristics

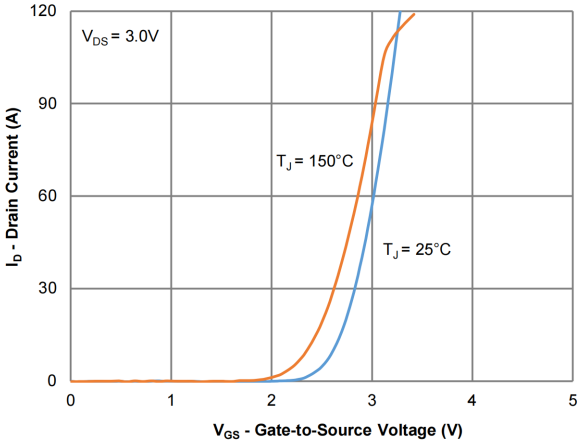


Figure 2: Transfer Characteristics

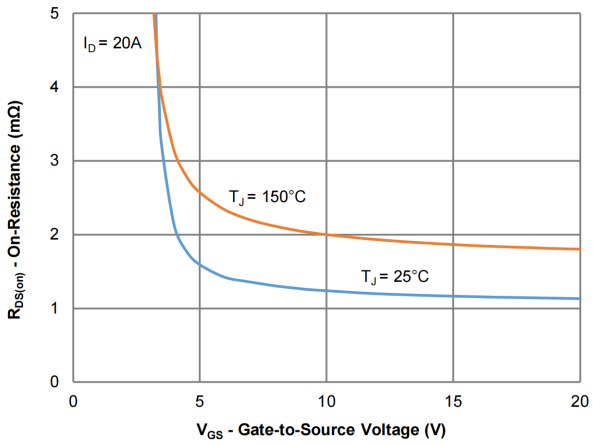


Figure 3: On-Resistance vs. Gate-Source Voltage

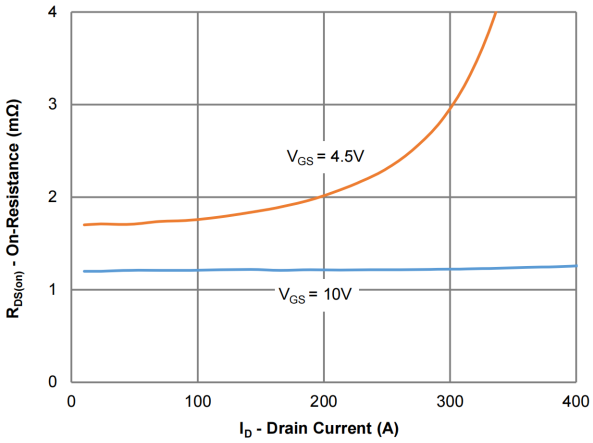


Figure 4: On-Resistance vs. Gate-Source Voltage

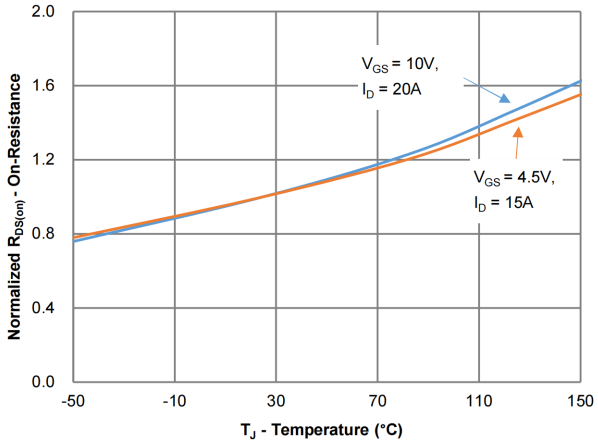


Figure 5: On-Resistance vs. Junction Temperature

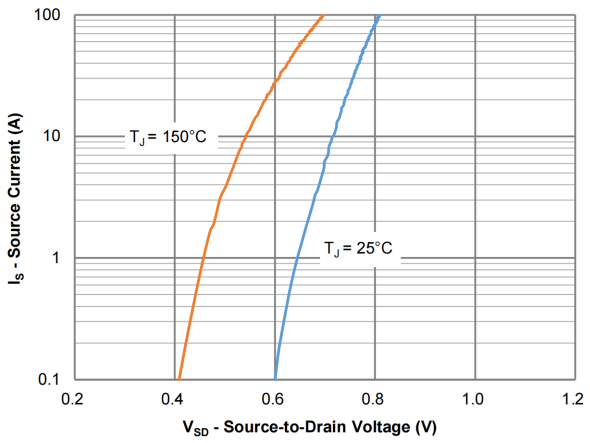


Figure 6: Source-Drain Diode Forward Voltage

Typical Electrical and Thermal Characteristics

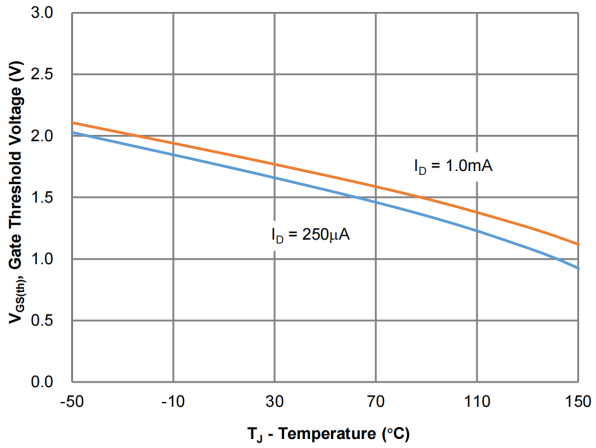


Figure 7: Gate Threshold Variation vs. Junction Temperature

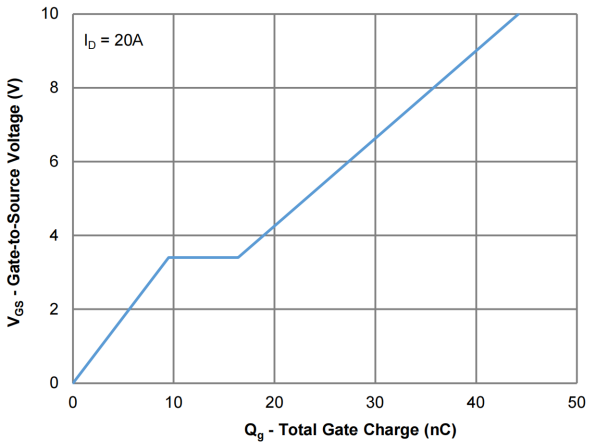


Figure 8: Gate Charge Characteristics

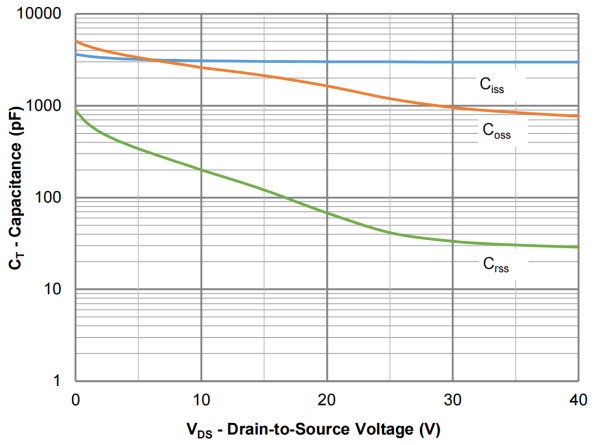


Figure 9: Capacitance Characteristics

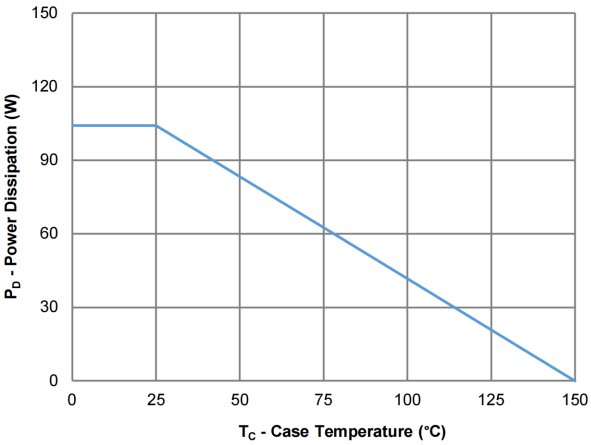


Figure 10: Power Derating

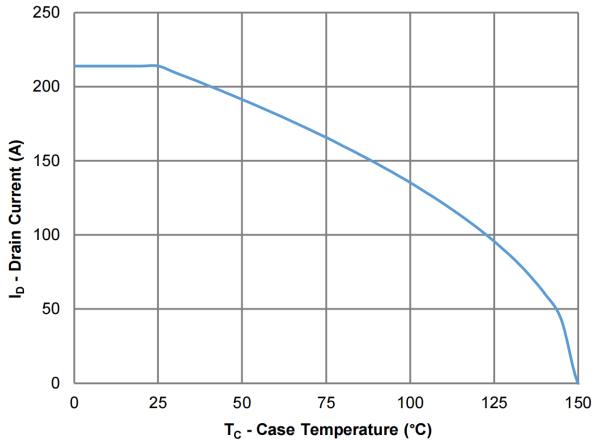


Figure 11: Current Derating

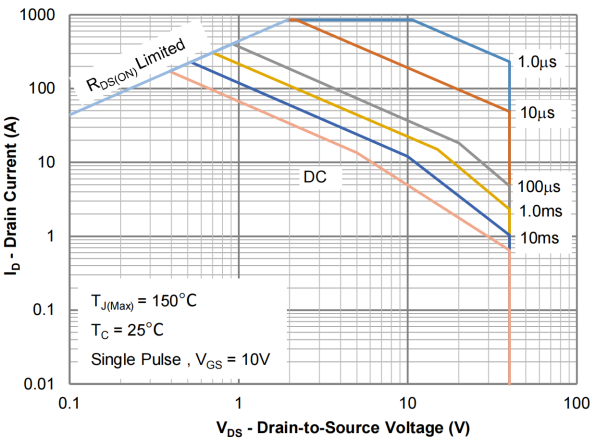


Figure 12: Safe Operating Area

Typical Electrical and Thermal Characteristics

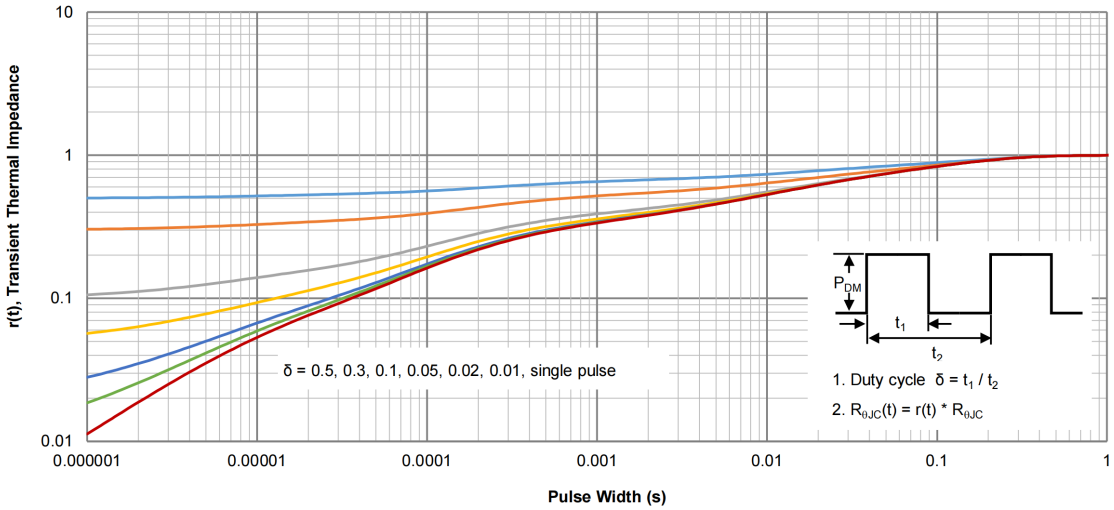
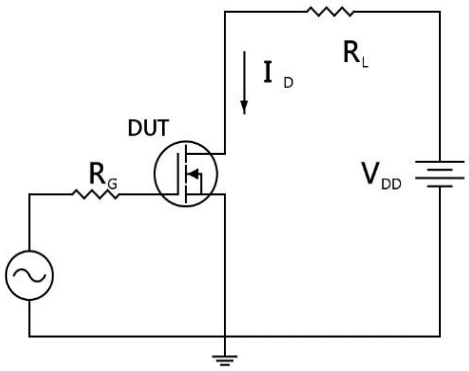
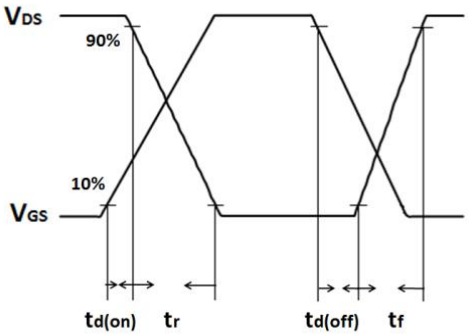


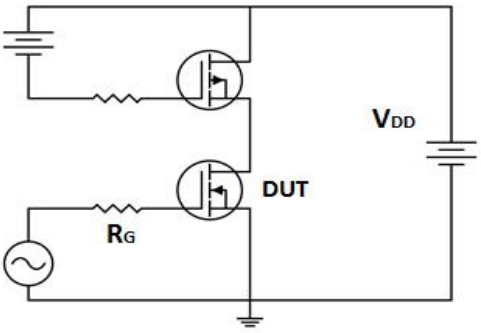
Figure 13: Normalized Maximum Transient Thermal Impedance

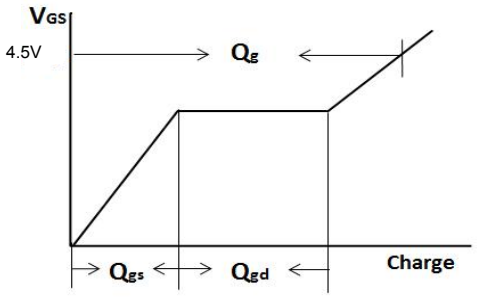
Resistive switching time test circuit &waveforms



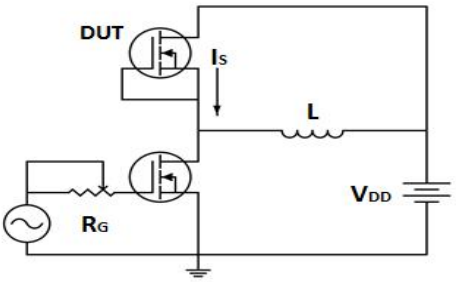


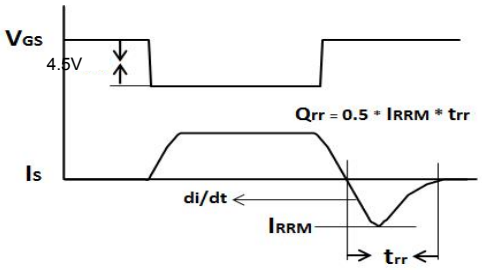
Gate charge test circuit &waveforms



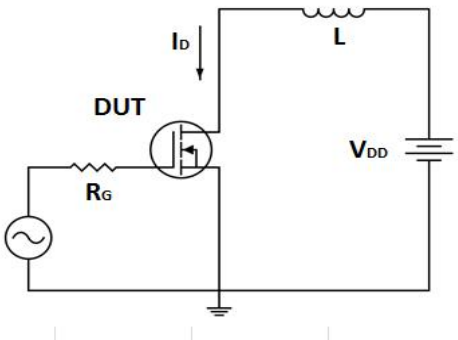


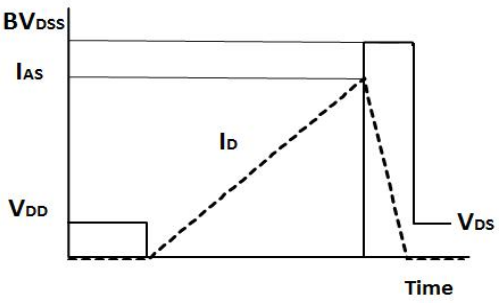
Peak diode recovery dv/dt circuit &waveforms



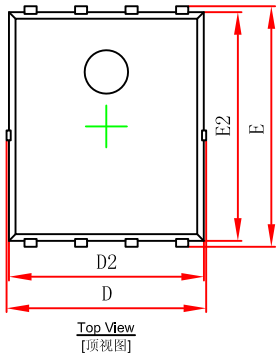


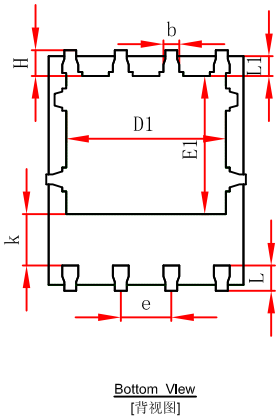
Unclamped inductive switching test circuit &waveforms

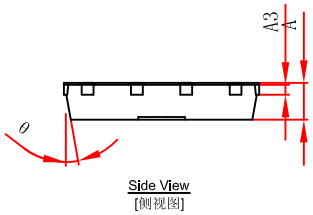




PDFN5x6-8L Package Outline Dimensions

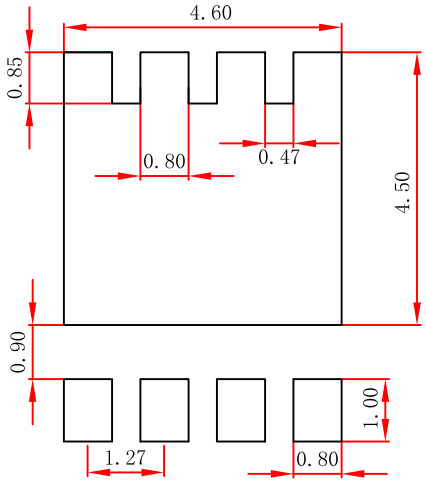






Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	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°

PDFN5x6-8L Suggested Pad Layout



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