

General Description

The TF020N03MG 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.

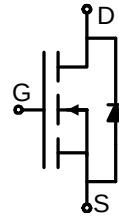
Features

- 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

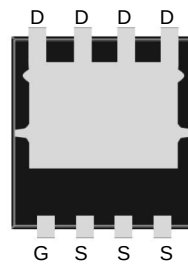
Product Summary



$$V_{DS} = 30V \quad I_D = 110A$$

$$R_{DS(ON)(10V \text{ typ})} = 2.2m\Omega$$

$$R_{DS(ON)(4.5V \text{ typ})} = 2.8m\Omega$$



PDFN3333-8L

Package Marking and Ordering Information:

Part NO.	TF020N03MG
Marking1	020N03MG
Marking2	TF:tuofeng; AA:device code; Y:year code; X:Week
MOQ	5000

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

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	$I_{D@TC=25^\circ C}$	110	A
	$I_{D@TC=75^\circ C}$	77	A
	$I_{D@TC=100^\circ C}$	66	A
Pulsed Drain Current ①	I_{DM}	430	A
Total Power Dissipation	$P_D@TC=25^\circ C$	40	W
Total Power Dissipation	$P_D@TA=25^\circ C$	1.0	W
Operating Junction Temperature	T_J	-55 to 150	$^\circ C$
Storage Temperature	T_{STG}	-55 to 150	$^\circ C$
Single Pulse Avalanche Energy	E_{AS}	200	mJ

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	3.0	$^{\circ}C/W$
Thermal resistance, junction - ambient	R_{thJA}	-	-	60	$^{\circ}C/W$
Soldering temperature, wavesoldering for 8 s	T_{sold}	-	-	265	$^{\circ}C$

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.0	1.6	2.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$	-	-	1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$	-	2.2	3.0	m Ω
		$V_{GS}=4.5V, I_D=15A$	-	2.8	4.0	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=10V, I_D=20A$	-	50	-	S
Source-drain voltage	V_{SD}	$I_S=20A$	-	0.75	1.2	V

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	$f = 1MHz$ $V_{DS}=15V$ $V_{GS}=0V$	-	1980	-	pF
Output capacitance	C_{oss}		-	768	-	
Reverse transfer capacitance	C_{rss}		-	75.0	-	

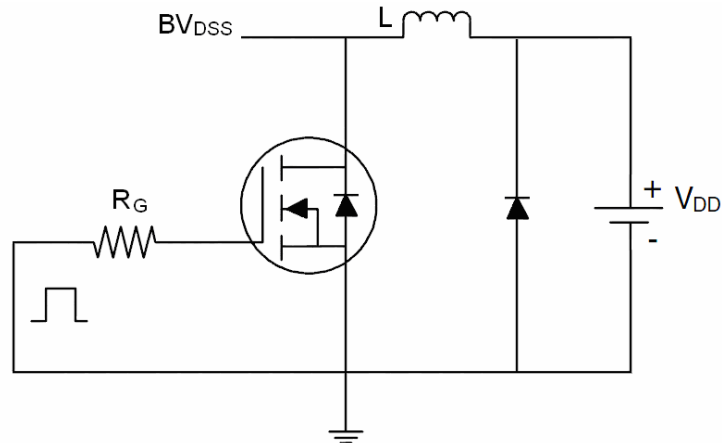
●Gate Charge characteristics($T_a = 25^{\circ}C$)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Gate Resistance	R_g	$f = 1MHz$		1.8		Ω
Total gate charge	Q_g	$V_{DD} = 15V$ $I_D = 20A$ $V_{GS} = 10V$	-	33	-	nC
Gate - Source charge	Q_{gs}		-	5.0	-	
Gate - Drain charge	Q_{gd}		-	5.9	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=15V$ $R_G=3.0\Omega, I_D=20A$		7.60		ns
Turn-ON Rise time	t_r			5.50		ns
Turn-Off Delay time	$t_{D(off)}$			31.5		ns
Turn-Off Fall time	t_f			9.00		ns
Reverse Recovery Time	t_{rr}	$V_{GS}=0V, I_f=20A$ $dI_S/dt=100A/\mu s$		42.0		ns
Reverse Recovery Charge	Q_{rr}			16.8		nC

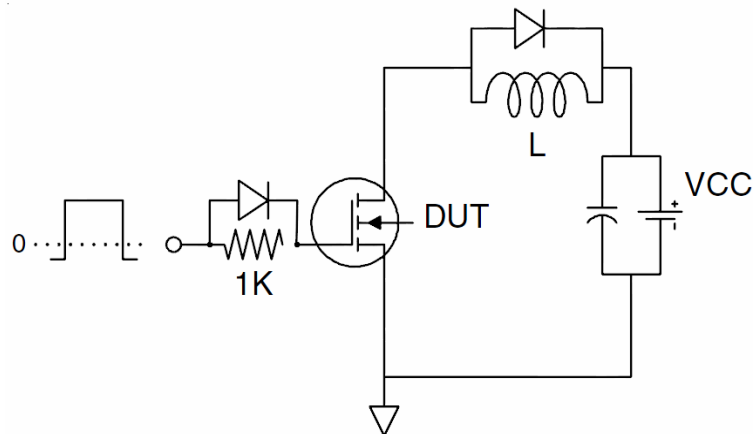
Note: ① Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$;

Test Circuit

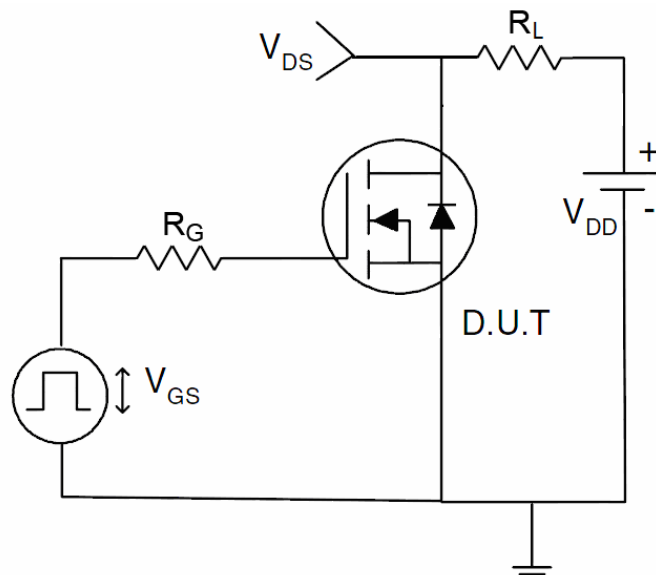
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics

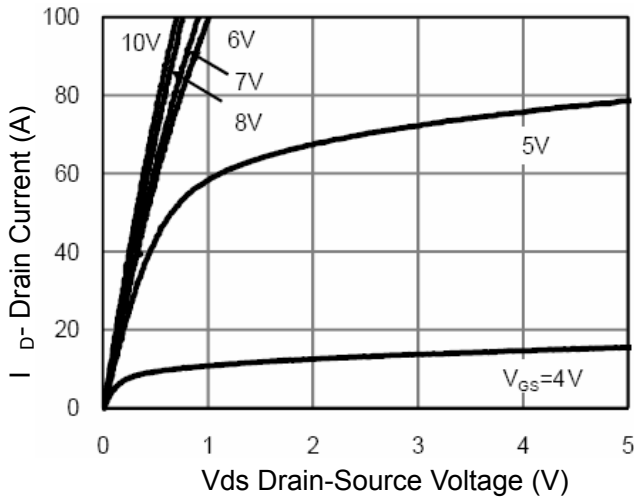


Figure 1 Output Characteristics

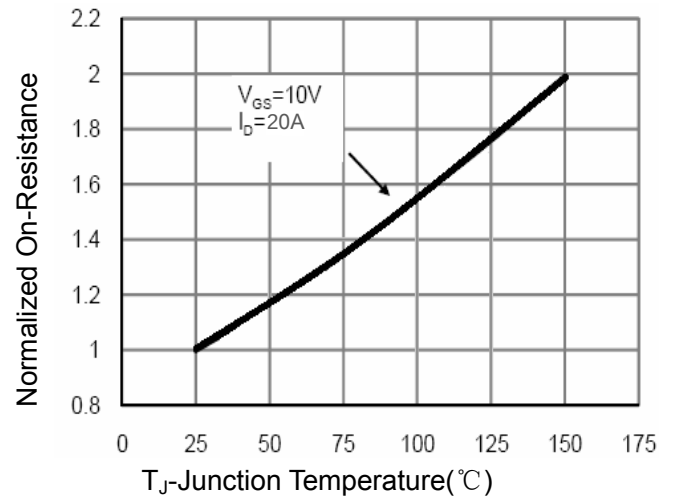


Figure 4 Rdson-Junction Temperature

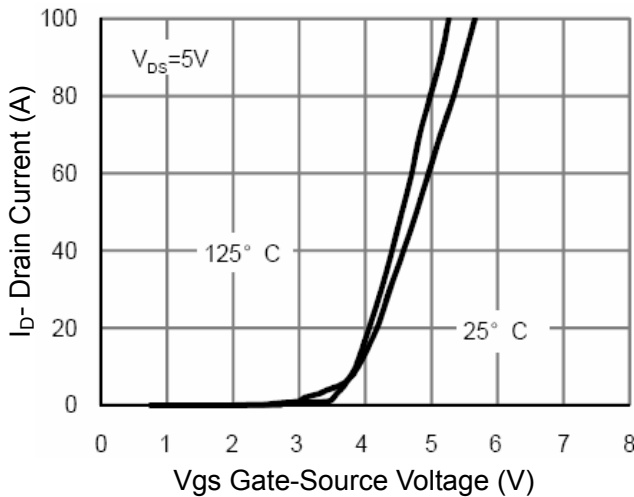


Figure 2 Transfer Characteristics

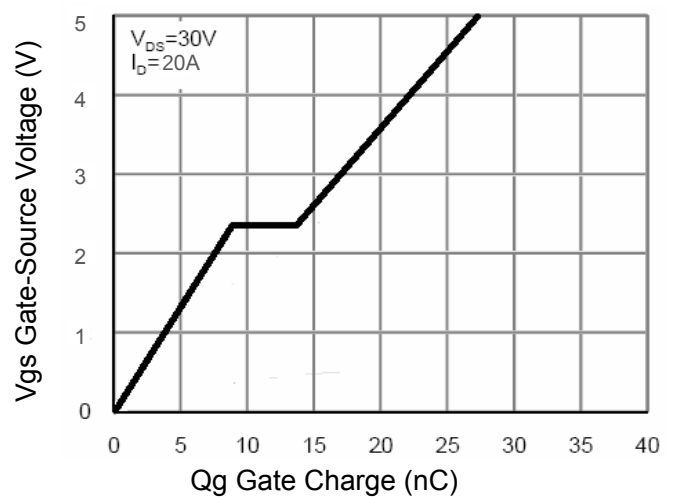


Figure 5 Gate Charge

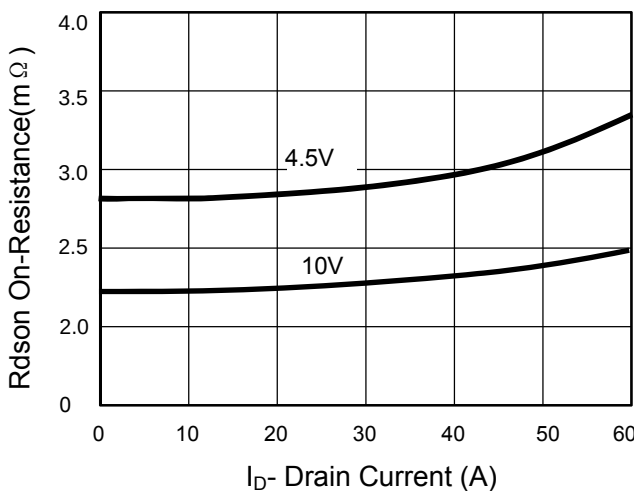


Figure 3 Rdson- Drain Current

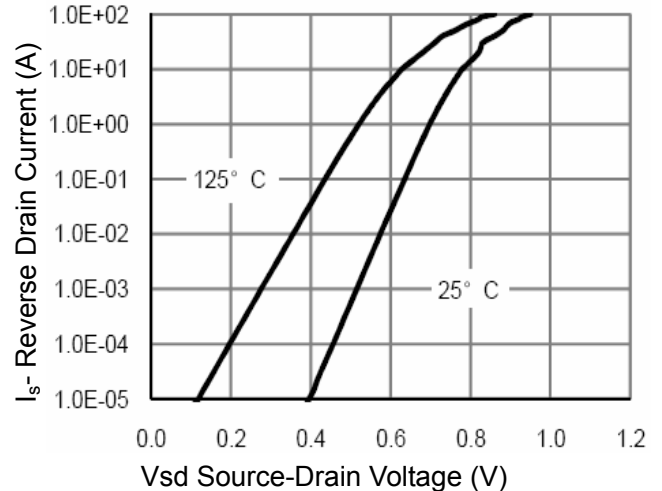


Figure 6 Source- Drain Diode Forward

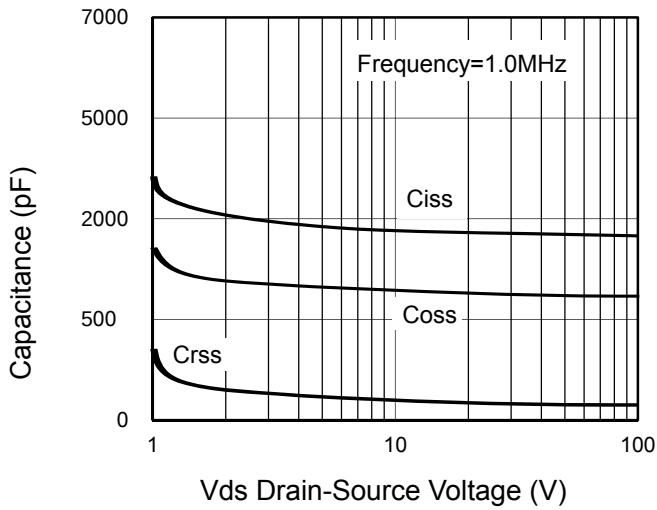


Figure 7 Capacitance vs Vds

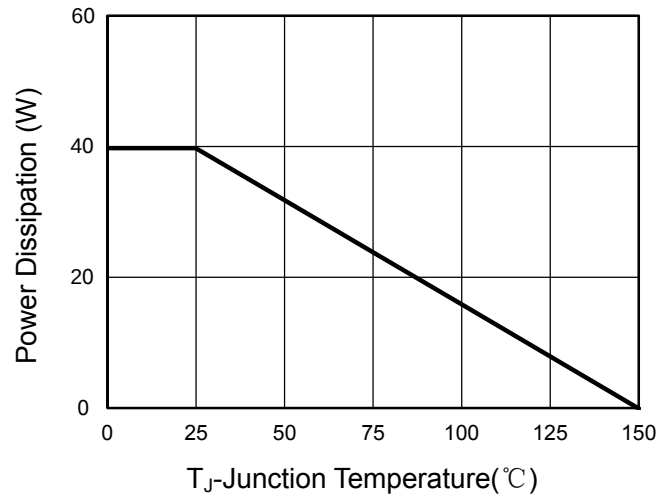


Figure 9 Power De-rating

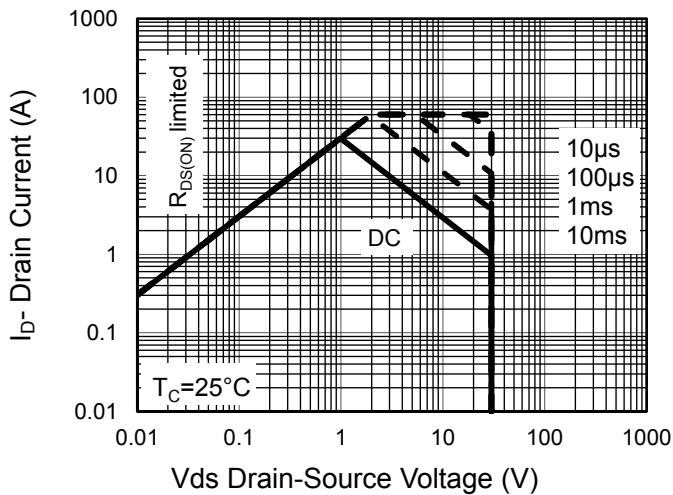


Figure 8 Safe Operation Area

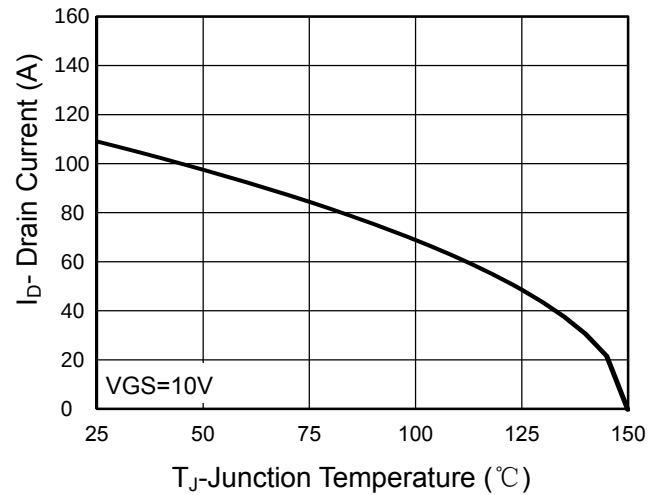


Figure 10 Current De-rating

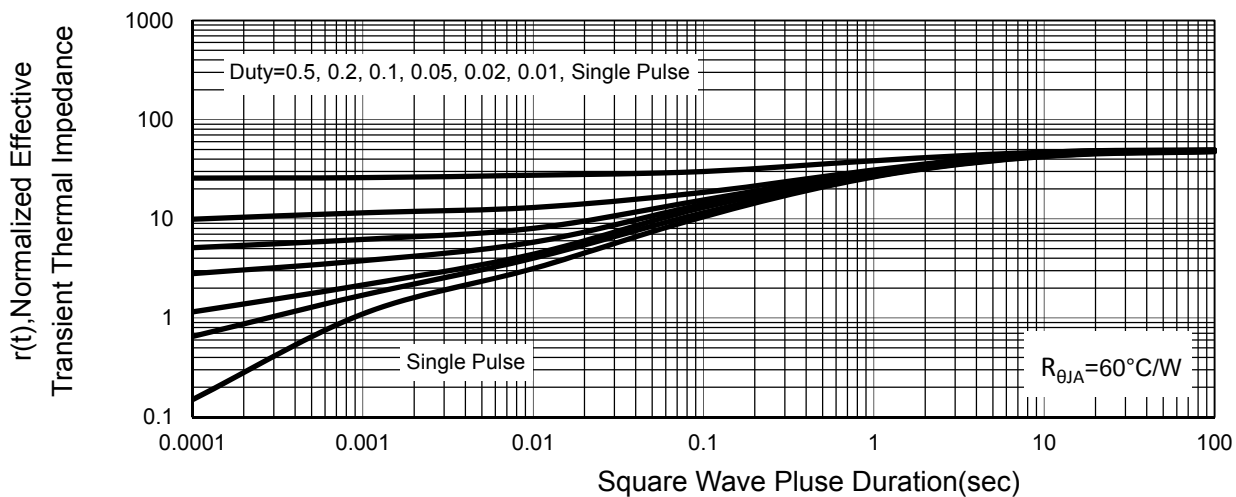
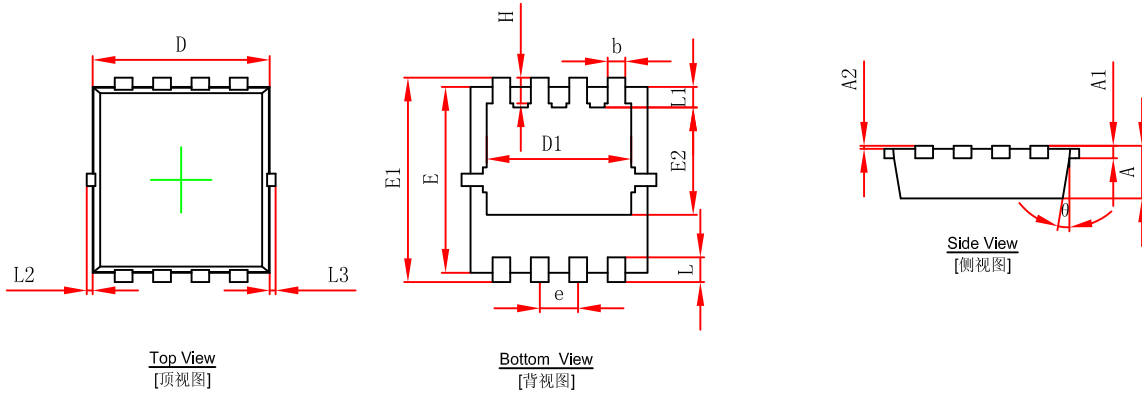


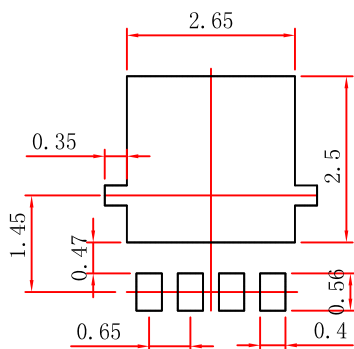
Figure 11 Normalized Maximum Transient Thermal Impedance

PDFN3333-8L Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.650	0.850	0.026	0.033
A1	0.152 REF.		0.006 REF.	
A2	0~0.05		0~0.002	
D	2.900	3.100	0.114	0.122
D1	2.300	2.600	0.091	0.102
E	2.900	3.100	0.114	0.122
E1	3.150	3.450	0.124	0.136
E2	1.535	1.935	0.060	0.076
b	0.200	0.400	0.008	0.016
e	0.550	0.750	0.022	0.030
L	0.300	0.500	0.012	0.020
L1	0.180	0.480	0.007	0.019
L2	0~0.100		0~0.004	
L3	0~0.100		0~0.004	
H	0.315	0.515	0.012	0.020
θ	9°	13°	9°	13°

PDFN3333-8L 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.