

General Description

The TF050N03MG 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.

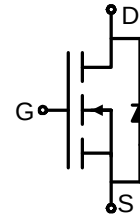
Features

- 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

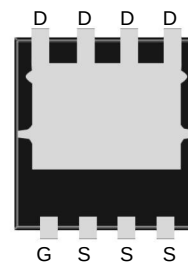
Product Summary



$$V_{DS} = 30V \quad I_D = 50A$$

$$R_{DS(10V \text{ TYP})} = 5.3m\Omega$$

$$R_{DS(4.5V \text{ TYP})} = 7.5m\Omega$$



PDFN3333-8L

Package Marking and Ordering Information:

Part NO.	TF050N03MG
Marking1	050N03MG:TF050N03MG
Marking2	TF:tuofeng; Y:year code; X:Week; AA:device code;
Basic ordering unit (pcs)	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	$I_{D@TC=25^\circ C}$	50	A
	$I_{D@TC=75^\circ C}$	35	A
	$I_{D@TC=100^\circ C}$	30	A
Pulsed Drain Current ①	I_{DM}	150	A
Total Power Dissipation	$P_D@TC=25^\circ C$	30	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}	45	mJ

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	5.0	$^{\circ}C/W$
Thermal resistance, junction - ambient	R_{thJA}	-	-	65	$^{\circ}C/W$
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	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.1	1.6	2.1	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	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$	-	5.3	6.5	m Ω
		$V_{GS}=4.5V, I_D=15A$	-	7.5	9.5	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=10V, I_D=20A$	-	45	-	S
Source-drain voltage	V_{SD}	$I_S=15A$	-	0.81	1.20	V

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	$f=1MHz$ $V_{DS}=15V$ $V_{GS}=0V$	-	625	-	pF
Output capacitance	C_{oss}		-	240	-	
Reverse transfer capacitance	C_{rss}		-	25.0	-	

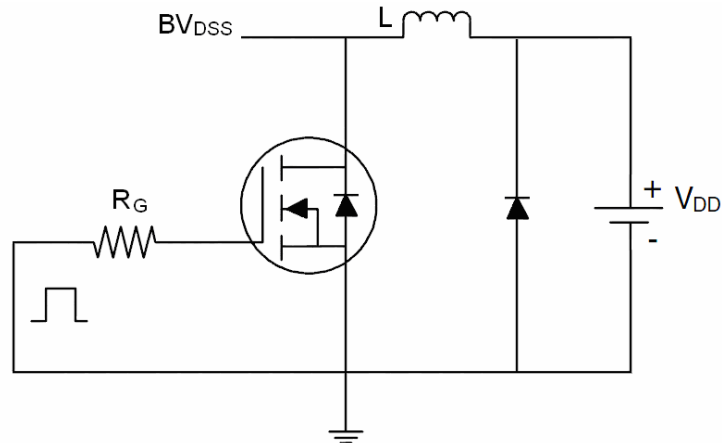
●Switching Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Turn-on delay time	$t_{d(on)}$	$V_{DD}=15V$ $I_D=20A$ $R_G=3.0\Omega$ $V_{GS}=10V$	-	4.4	-	nS
Rise time	t_r		-	3.6	-	
Turn-off delay time	$t_{d(off)}$		-	12.2	-	
Fall time	t_f		-	2.7	-	
Total Gate Charge	Q_g	$I_D=20A$ $V_{DS}=15V$ $V_{GS}=10V$	-	10.3	-	nC
Gate -Source Charge	Q_{gs}		-	1.80	-	
Gate -Drain Charge	Q_{gd}		-	1.70	-	

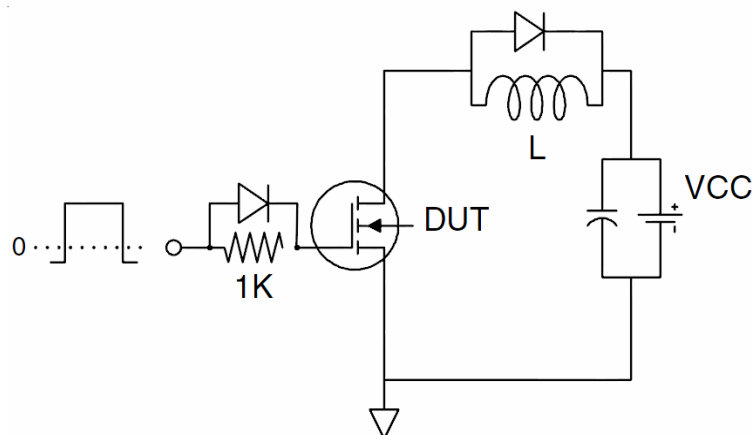
Note: ① Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$;

Test Circuit

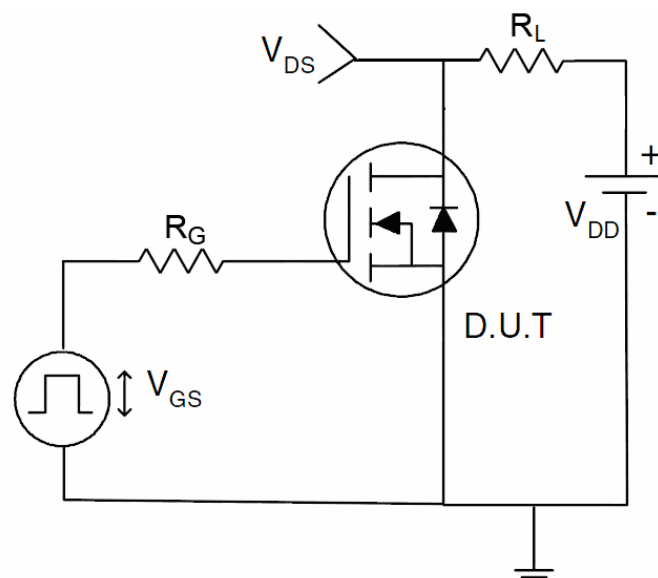
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Characteristics

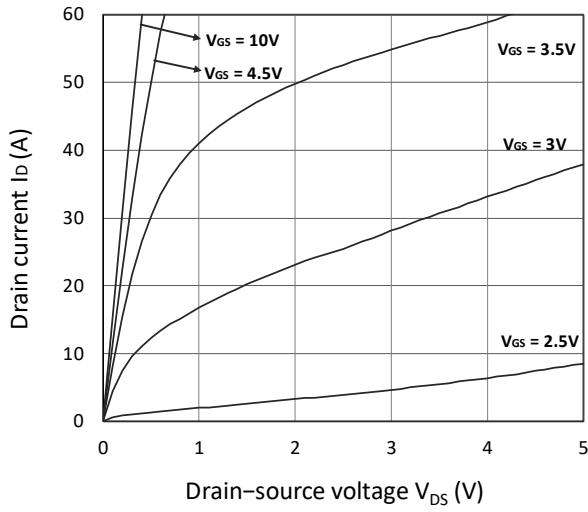


Figure 1. Output Characteristics

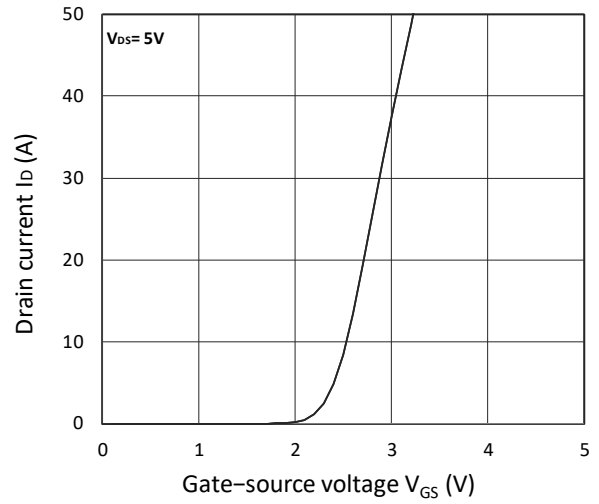


Figure 2. Transfer Characteristics

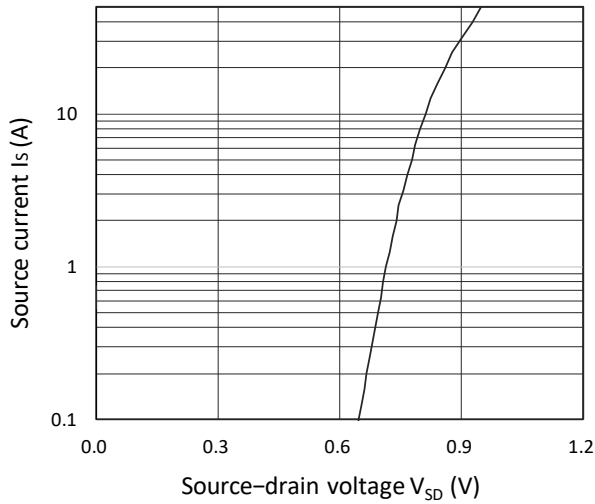


Figure 3. Forward Characteristics of Reverse

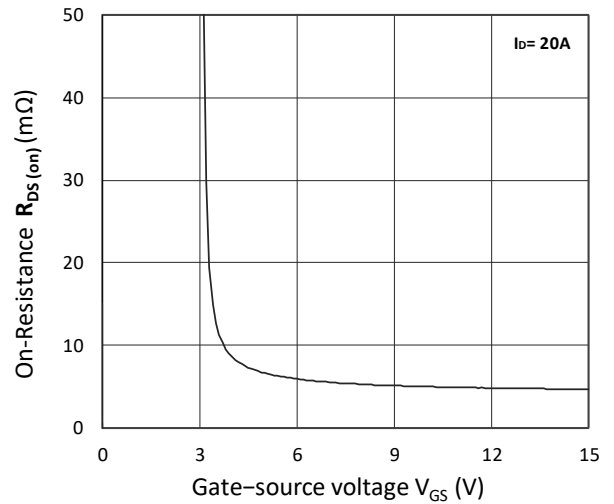


Figure 4. $R_{DS(on)}$ vs. V_{GS}

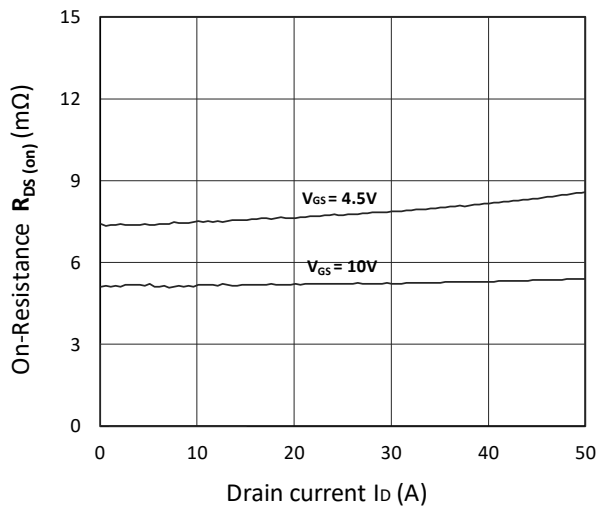


Figure 5. $R_{DS(on)}$ vs. I_D

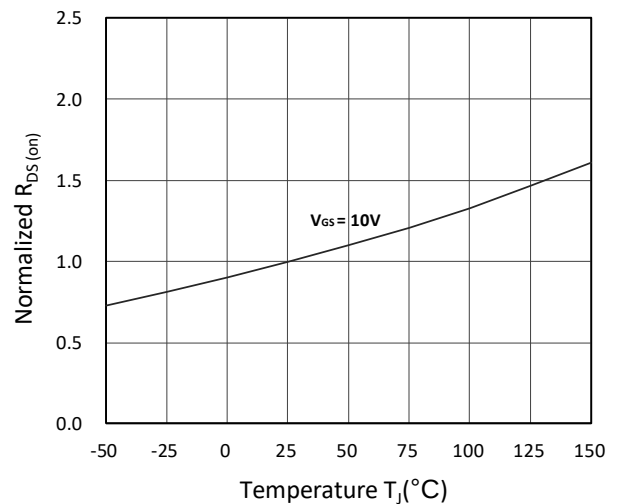


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

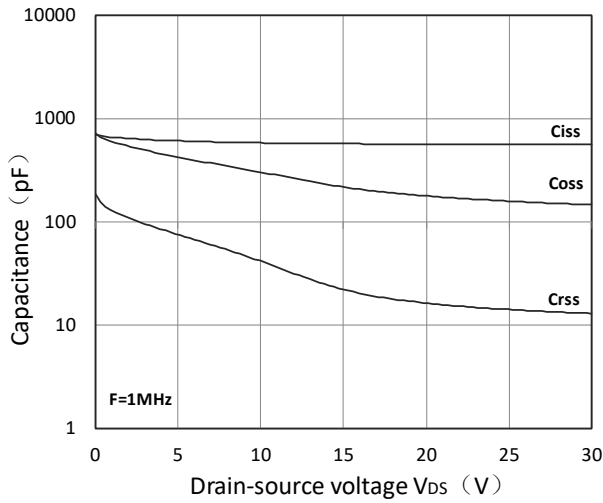


Figure 7. Capacitance Characteristics

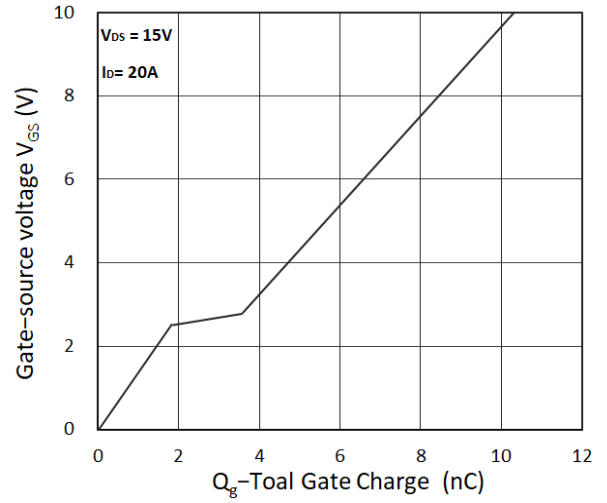


Figure 8. Gate Charge Characteristics

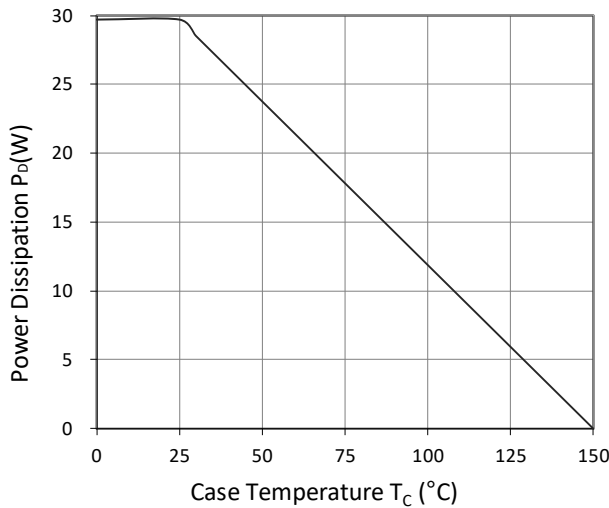


Figure 9. Power Dissipation

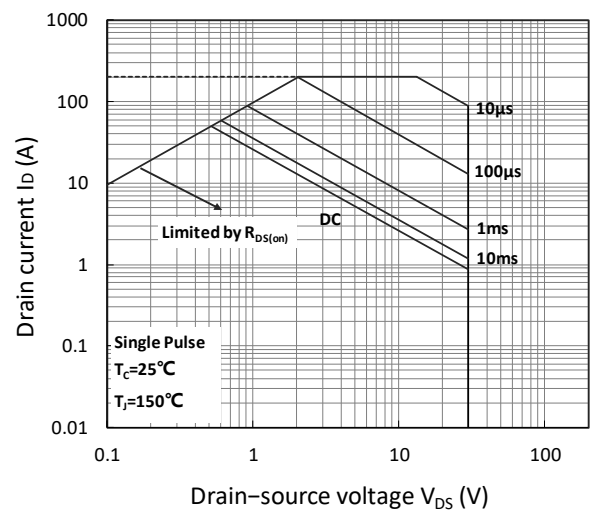


Figure 10. Safe Operating Area

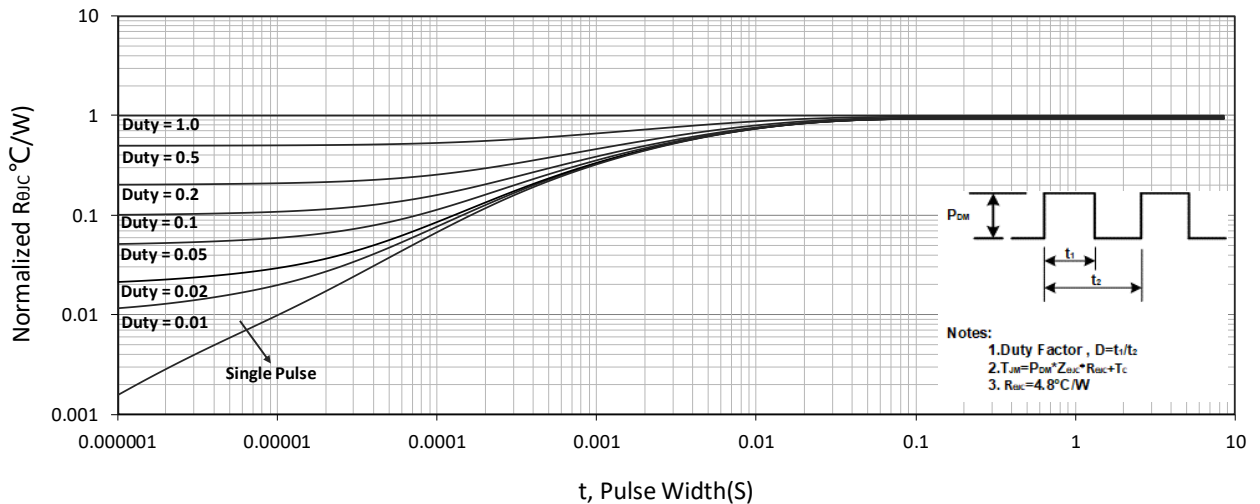
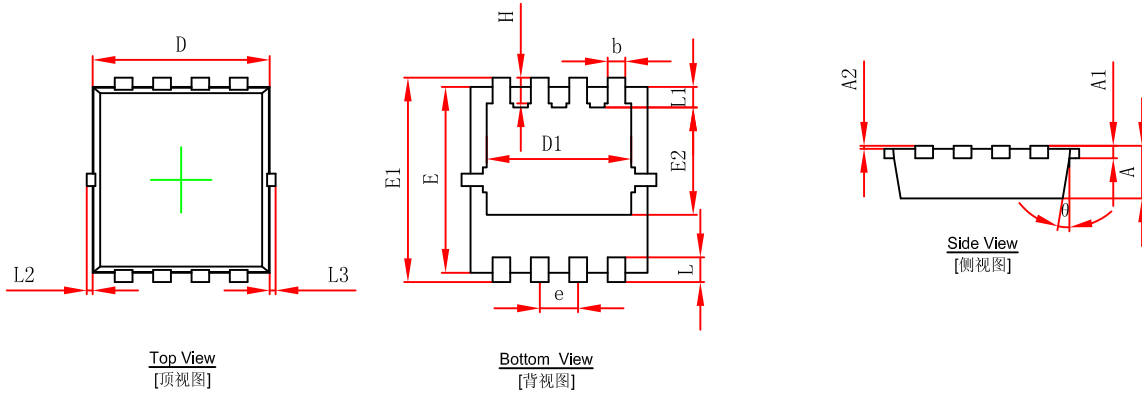


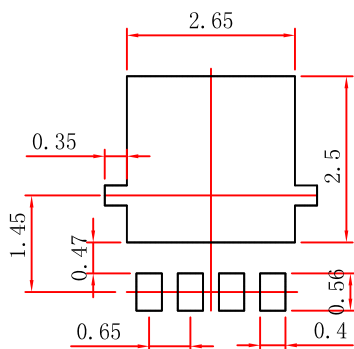
Figure 11. Normalized Maximum Transient Thermal Impedance

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: ± 0.05 mm.
3. The pad layout is for reference purposes only.