

• General Description

The TF050P04N combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$.

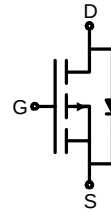
• Features

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

• Application

Load Switches
DC/DC
BLDC Motor driver

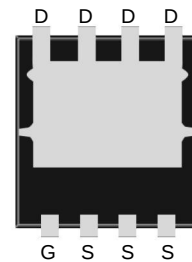
• Product Summary



$$V_{DS} = -40V \quad I_D = -90A$$

$$R_{DS(ON)}(-10V \text{ typ}) = 4.9m\Omega$$

$$R_{DS(ON)}(-4.5V \text{ typ}) = 6.5m\Omega$$



PDFNWB5x6-8L

• Ordering Information:

Part NO.	TF050P04N
Marking1	050P04N
Marking2	TF:tuofeng; Y:year code; XX: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}	-40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	$I_{D@TC=25^\circ C}$	-90	A
	$I_{D@TC=75^\circ C}$	-63	A
	$I_{D@TC=100^\circ C}$	-54	A
Pulsed Drain Current ^①	I_{DM}	-290	A
Total Power Dissipation ^②	$P_D@T_A=25^\circ C$	65	W
Total Power Dissipation	$P_D@T_A=25^\circ C$	2.0	W
Operating Junction Temperature	T_J	-55 to 150	$^\circ C$
Storage Temperature	T_{STG}	-55 to 150	$^\circ C$
Single Pulse Avalanche Energy@L=0.1mH	E_{AS}	365	mJ

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case ^②	R_{thJC}	-	-	4.6	°C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	55	°C/W
Soldering temperature, wave soldering for 8s	T_{sold}	-	-	265	°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	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.2	-1.6	-2.3	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=-40V, V_{GS}=0V$			-1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$			± 100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-30A$		4.9	6.5	m Ω
		$V_{GS}=-4.5V, I_D=-20A$		6.5	9.0	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=-10V, I_D=-20A$		15		s
Source-drain voltage	VSD	$I_S=-30A$		0.83		V

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=-20V$ $f = 1MHz$	-	6638	-	pF
Output capacitance	C_{oss}		-	545	-	
Reverse transfer capacitance	C_{rss}		-	345	-	

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

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	Q_g	$V_{DD}=-20V$	-	118	-	nC
Gate - Source charge	Q_{gs}	$I_D = -20A$	-	13	-	
Gate - Drain charge	Q_{gd}	$V_{GS} = -10V$	-	22	-	

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

② Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;

Typical Performance Characteristics

Figure1: Output Characteristics

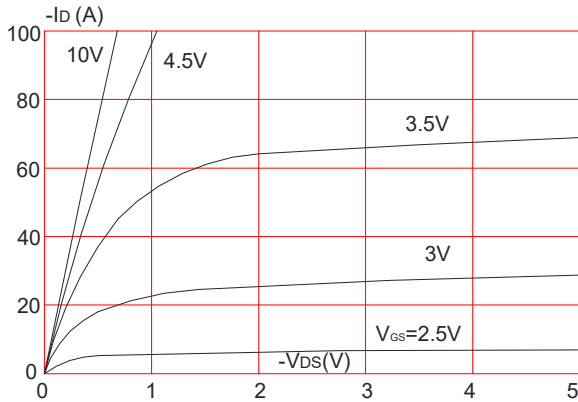


Figure 2: Typical Transfer Characteristics

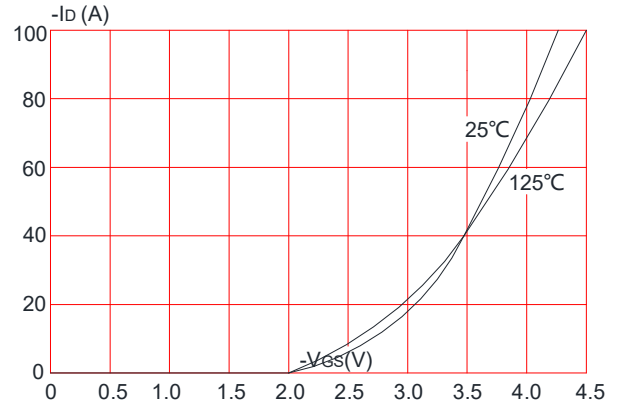


Figure 3: On-resistance vs. Drain Current

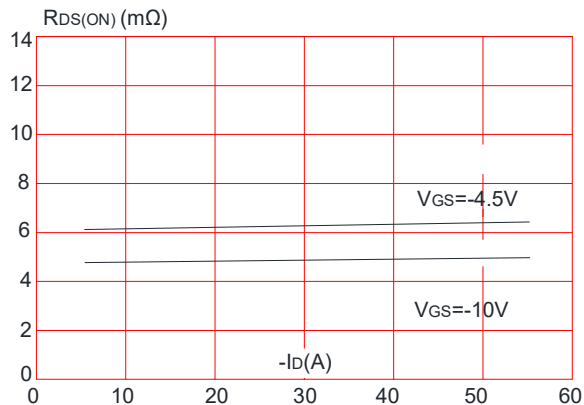


Figure 4: Body Diode Characteristics

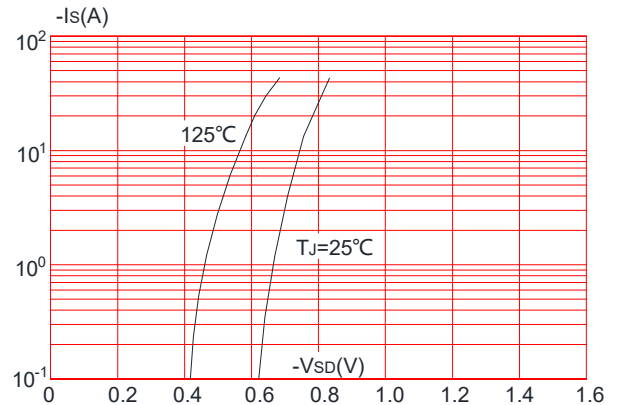


Figure 5: Gate Charge Characteristics

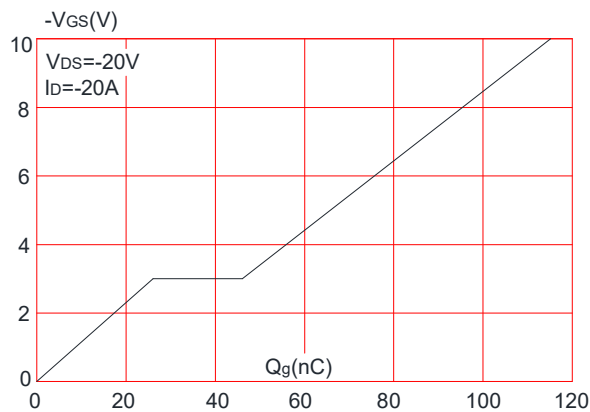


Figure 6: Capacitance Characteristics

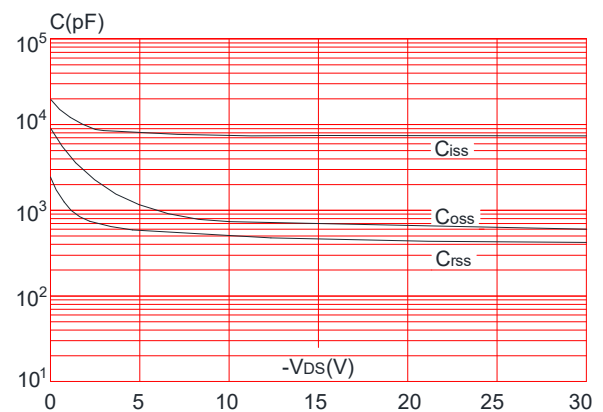


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

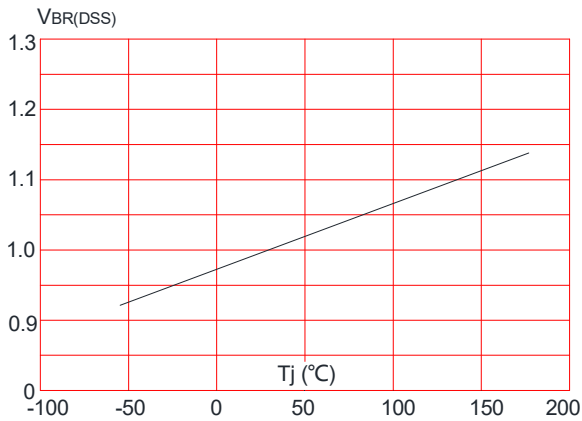


Figure 8: Normalized on Resistance vs. Junction Temperature

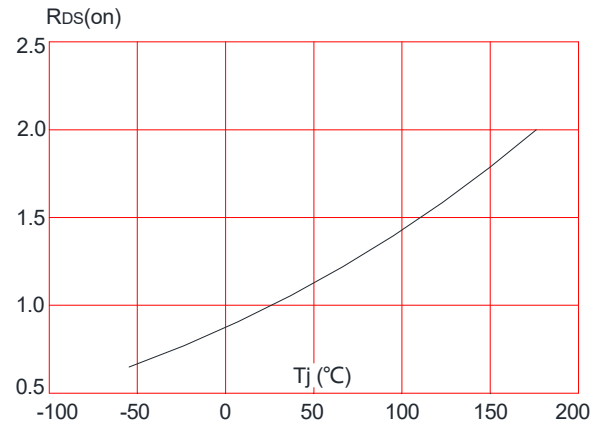


Figure 9: Maximum Safe Operating Area

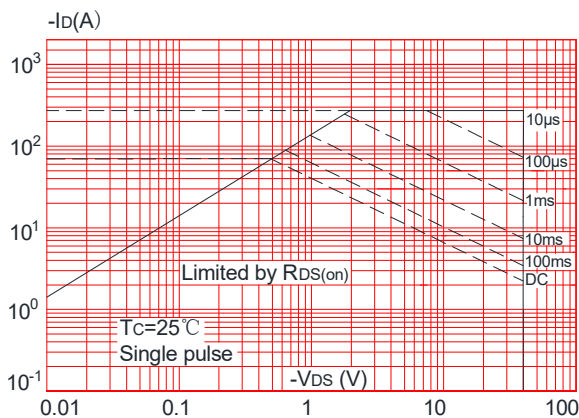


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

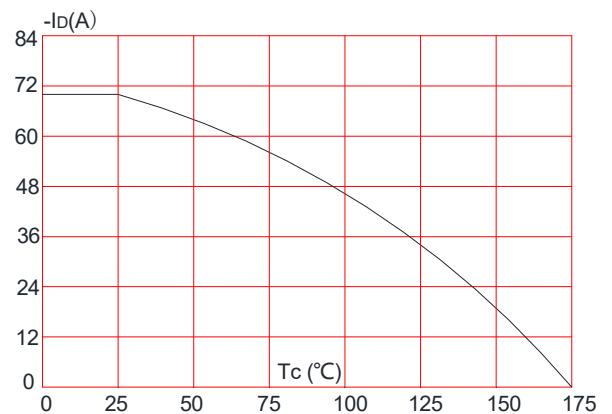
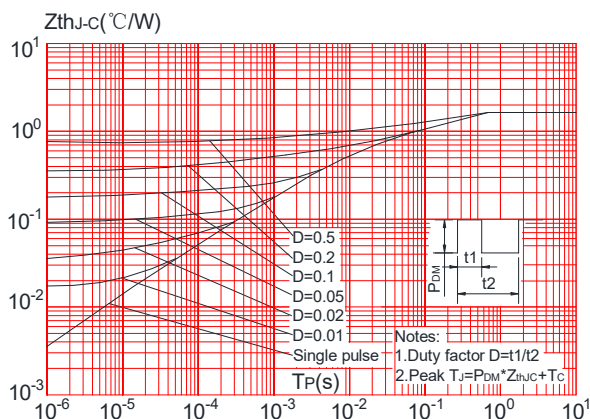
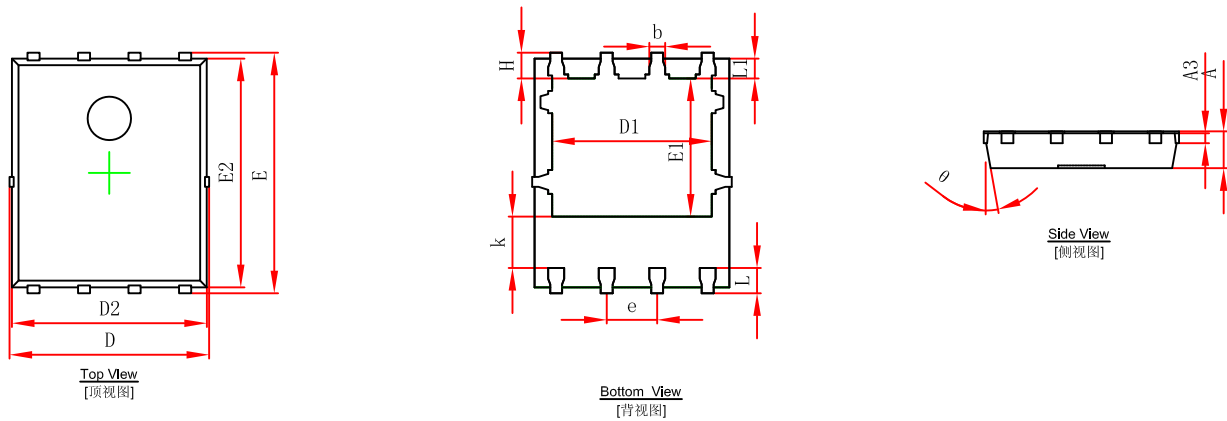


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

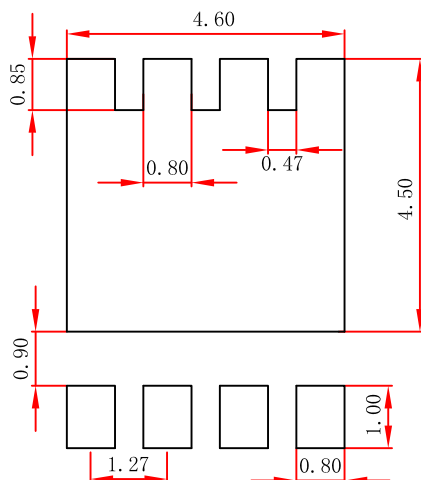


PDFNWB5x6-8L Package Outline Dimensions



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.