

P -CHANNEL ENHANCEMENT MODE POWER MOSFET

TF080P04K

● General Description

The TF080P04K 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

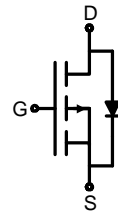
MB/VGA Vcore

SMPS 2nd Synchronous Rectifier

POL application

BLDC Motor driver

● Product Summary



$$V_{DS} = -40V \quad I_D = -50A$$

$$R_{DS(ON)(-10V \text{ typ})} = 8.30m\Omega$$

$$R_{DS(ON)(-4.5V \text{ typ})} = 12.5m\Omega$$



TO-251



TO-252

● Ordering Information:

Part NO.	TF080P04K
Marking 1	080P04K:TF080P04K
Marking 2	Logo:tuofeng; Y:year code; XX:Week; AA:device code;
MOQ	TO-251:50/PCS TO-252:2500/PCS

● 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	$I_D @ T_C = 25^\circ C$	-50	A
	$I_D @ T_C = 75^\circ C$	-35	A
	$I_D @ T_C = 100^\circ C$	-30	A
Pulsed Drain Current ①	I_{DM}	-120	A
Total Power Dissipation	$P_D @ T_C = 25^\circ C$	45	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	$^\circ C$

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

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Single Pulse Avalanche Energy	E_{AS}	140			mJ	
Avalanche Current	$I_{AS} I_{AR}$	-24			A	
●Thermal resistance						
Parameter	Symbol	Min.	Typ.	Max.	Unit	
Thermal resistance, junction - case	R_{thJC}	-	-	5.5	° C/W	
Thermal resistance, junction - ambient	R_{thJA}	-	-	60	° 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	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	-1.1	-1.7	-2.5	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	$R_{DS(ON)}$	$V_{GS} = -10V, I_D = -20A$		8.30	12.0	m Ω
		$V_{GS} = -4.5V, I_D = -10A$		12.5	18.0	m Ω
Forward Transconductance	g_{FS}	$V_{DS} = -20V, I_D = -20A$		18		S
Source-drain voltage	V_{SD}	$I_S = -20A$			1.20	V
●Electronic Characteristics						
Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	$V_{DS} = -15V, V_{GS} = 0V$ $f = 1MHz$	-	3800	-	pF
Output capacitance	C_{oss}		-	329	-	
Reverse transfer capacitance	C_{rss}		-	289	-	
●Gate Charge characteristics ($T_a = 25^\circ C$)						
Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Gate Resistance	R_g	$f = 1MHz$		2.4		Ω
Total gate charge	Q_g	$V_{DD} = -20V$ $I_D = -20A$ $V_{GS} = -10V$	-	68	-	nC
Gate - Source charge	Q_{gs}		-	10	-	
Gate - Drain charge	Q_{gd}		-	14	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{GS} = -10V, V_{DS} = -20V$ $R_G = 2.4\Omega, I = -20A$		10		ns
Turn-ON Rise time	t_r			82		ns
Turn-Off Delay time	$t_{D(off)}$			93		ns
Turn-Off Fall time	t_f			74		ns

Typical Performance Characteristics

Figure 1: Output Characteristics

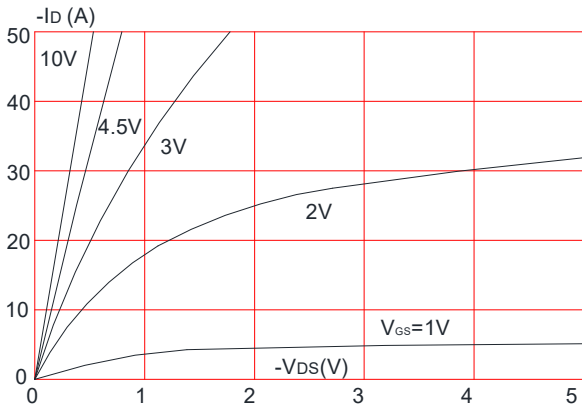


Figure 2: Typical Transfer Characteristics

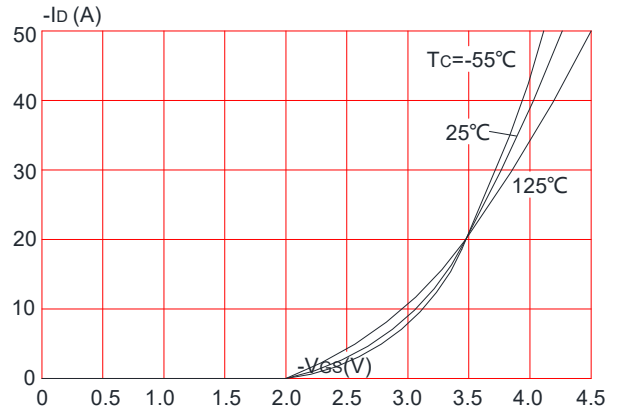


Figure 3: On-resistance vs. Drain Current

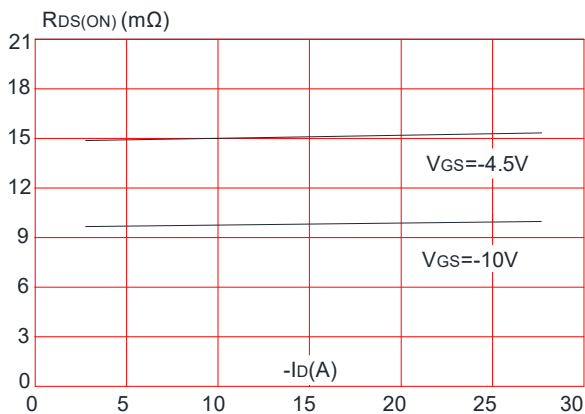


Figure 4: Body Diode Characteristics

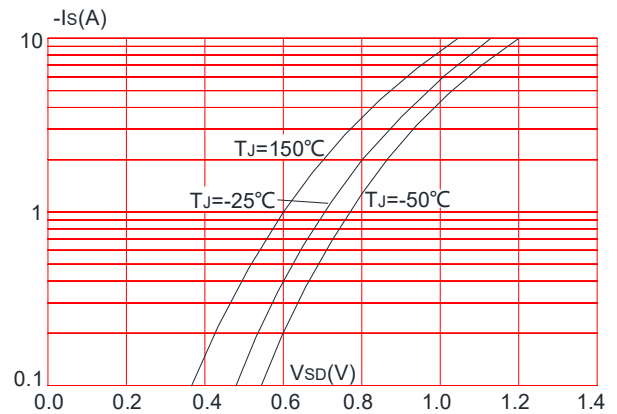


Figure 5: Gate Charge Characteristics

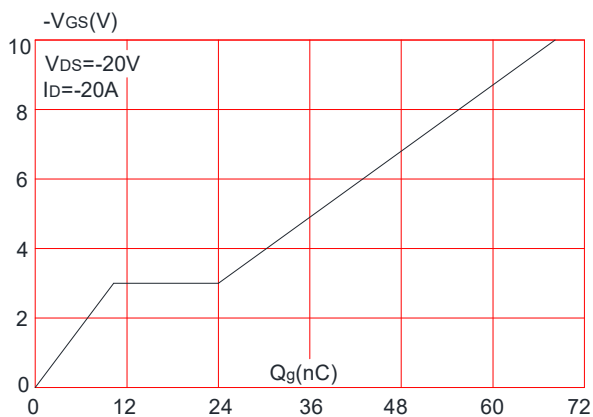
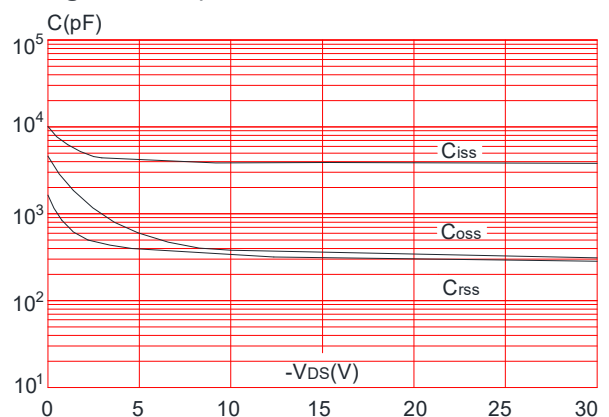


Figure 6: Capacitance Characteristics



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Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

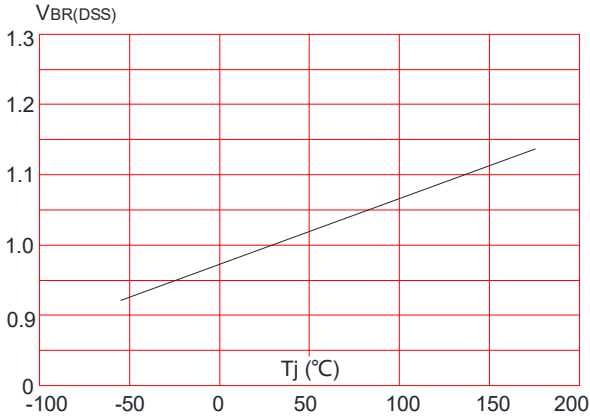


Figure 8: Normalized on Resistance vs. Junction Temperature

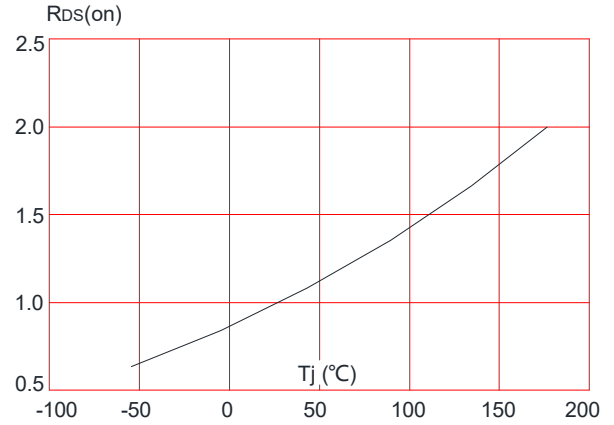


Figure 9: Maximum Safe Operating Area

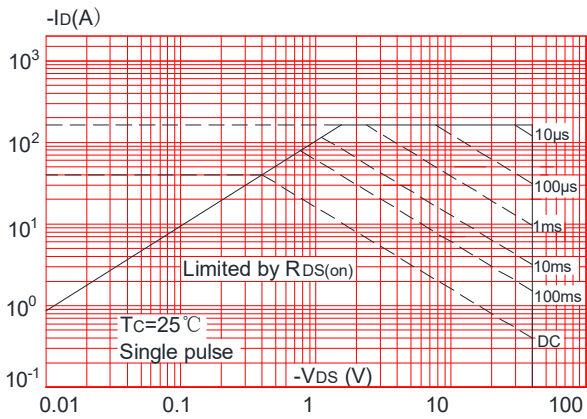


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

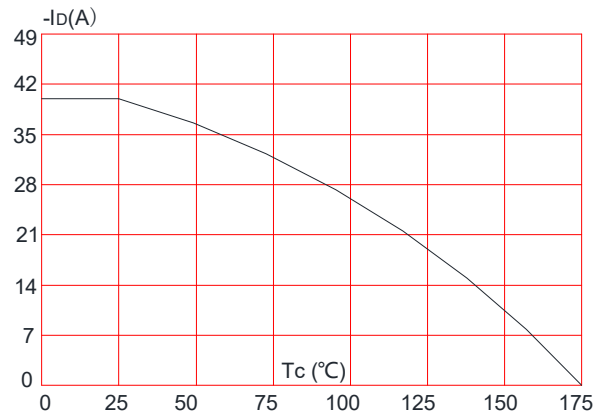
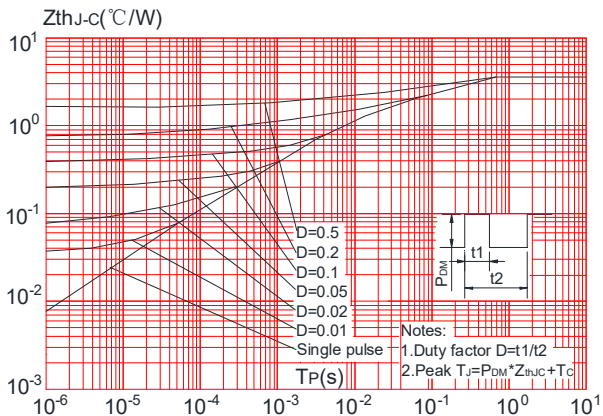
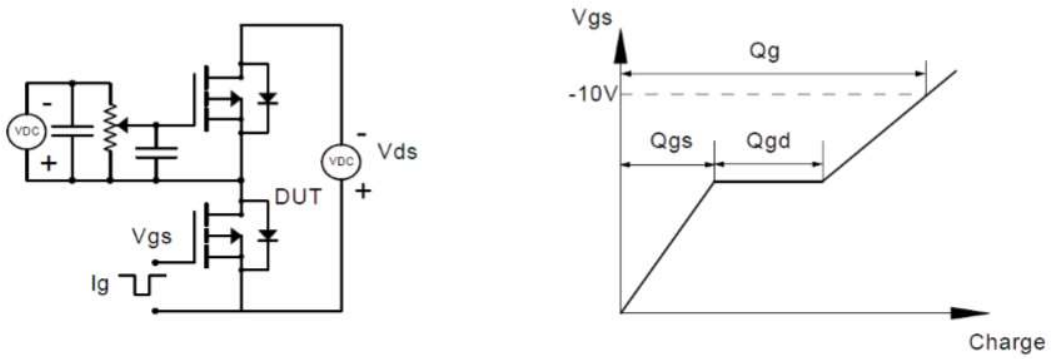


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

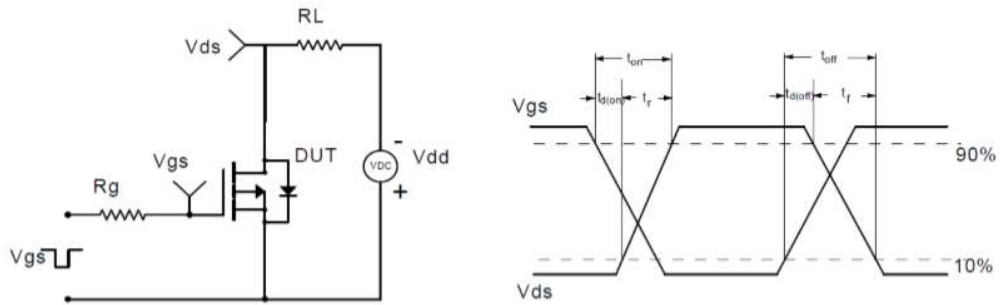


Test Circuit

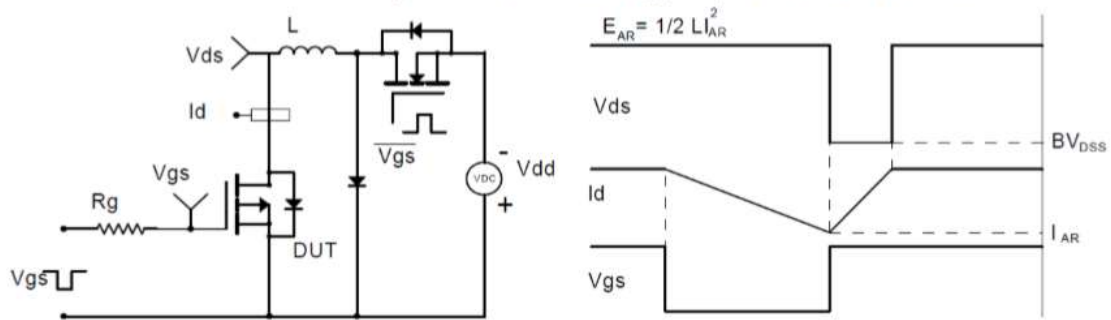
Gate Charge Test Circuit & Waveform



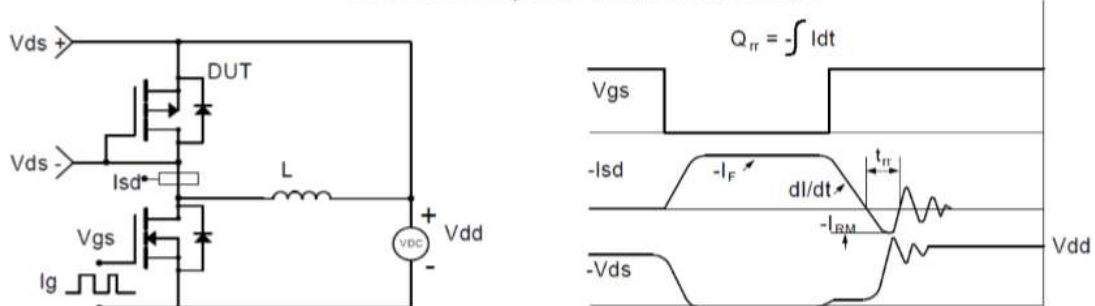
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

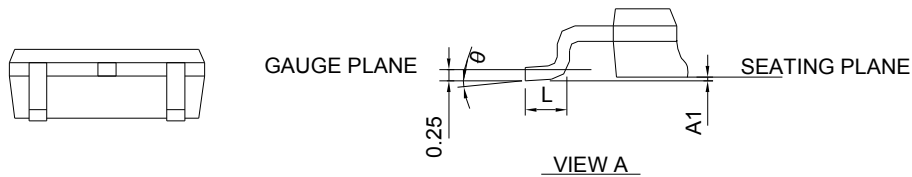
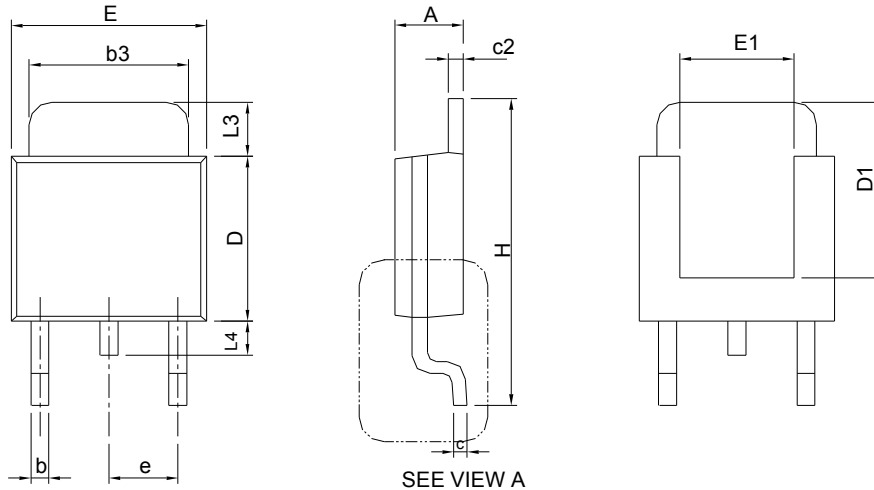


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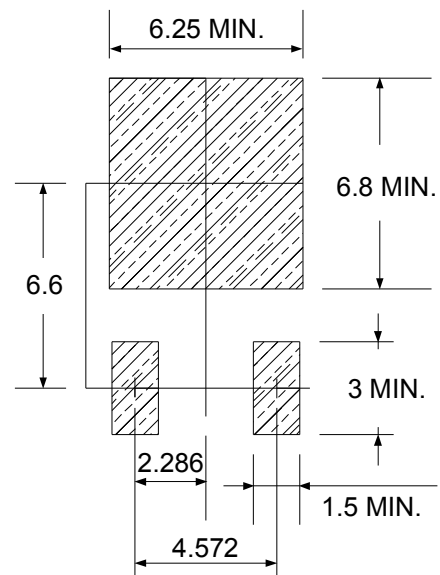
Package Information

TO-252



DIMENSIONS	TO-252			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.39	0.086	0.094
A1		0.13		0.005
b	0.50	0.89	0.020	0.035
b3	4.95	5.46	0.195	0.215
c	0.46	0.61	0.018	0.024
c2	0.46	0.89	0.018	0.035
D	5.33	6.22	0.210	0.245
D1	4.57	6.00	0.180	0.236
E	6.35	6.73	0.250	0.265
E1	3.81	6.00	0.150	0.236
e	2.29 BSC		0.090 BSC	
H	9.40	10.41	0.370	0.410
L	0.90	1.78	0.035	0.070
L3	0.89	2.03	0.035	0.080
L4		1.02		0.040
θ	0°	8°	0°	8°

RECOMMENDED LAND PATTERN



UNIT: mm