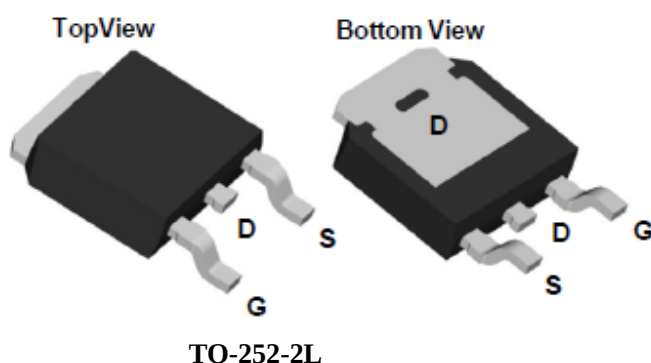


Features

The TW60N04D uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

Product Summary

V_{DS}	40V
I_D	60A
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 8m Ω
$R_{DS(ON)}$ (at $V_{GS}=4.5V$)	< 18m Ω



Maximum Ratings($T_a=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current	I_D	60	A
Pulsed Drain Current ①	I_{DM}	220	
Continuous Source-Drain Current(Diode Conduction)	I_S	60	
Power Dissipation ②	P_D	64.6	W
Thermal Resistance from Junction to Ambient ($t \leq 5s$)	$R_{\theta JA}$	62	$^{\circ}\text{C}/\text{W}$
Operating Junction	T_J	150	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	-55~+175	$^{\circ}\text{C}$

Electrical Characteristics(T_J=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Parameters						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0V, I _D = 250μA	40	45		V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D = 250μA	1.2	1.6	2.0	V
Gate-Body leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} = ±20V			±100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 40V, V _{GS} =0V			1	μA
Static Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = 10V, I _D = 20A		7	8.5	mΩ
	R _{DS(on)}	V _{GS} =4.5V, I _D = 20A		15	18	mΩ
Forward Transconductance	g _{fs}	V _{DS} = 10V, I _D = 20A	15			S
Diode Forward Voltage	V _{SD}	I _S = 10A, V _{GS} =0V		0.8	1.2	V
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{DS} = 20V,V _{GS} =0V, f=1MHz		1800		pF
Output Capacitance	C _{oss}			280		pF
Reverse Transfer Capacitance	C _{rss}			190		pF
Total Gate Charge	Q _g	V _{DS} = 20V,V _{GS} = 10V, I _D = 20A		29		nC
Gate Source Charge	Q _{gs}			4.5		nC
Gate Drain Charge	Q _{gd}			6.4		nC
Switching Parameters						
Turn-On DelayTime	td(on)	V _{DD} =30 V RL= 25Ω, I _D = 25A, V _{GEN} = 10V,R _g = 25Ω		25		ns
Turn-On Rise Time	tr			5		ns
Turn-Off DelayTime	td(off)			50		ns
Turn-Off Fall Time	tf			6		ns

Note :

1. Repetitive Rating : Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t < 5 sec.
3. Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production testing.

Typical Electrical and Thermal Characteristics

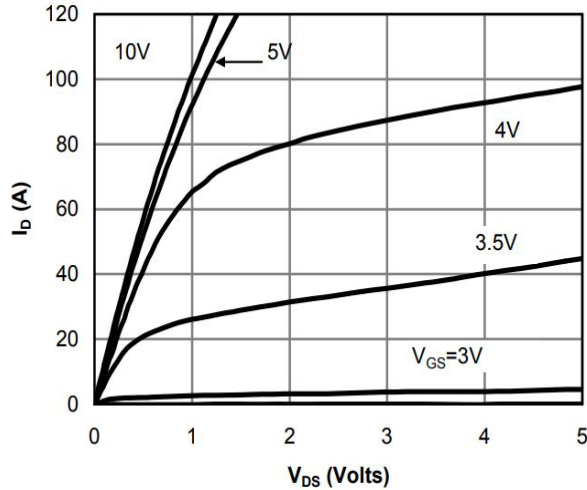


Fig 1: On-Region Characteristics (Note E)

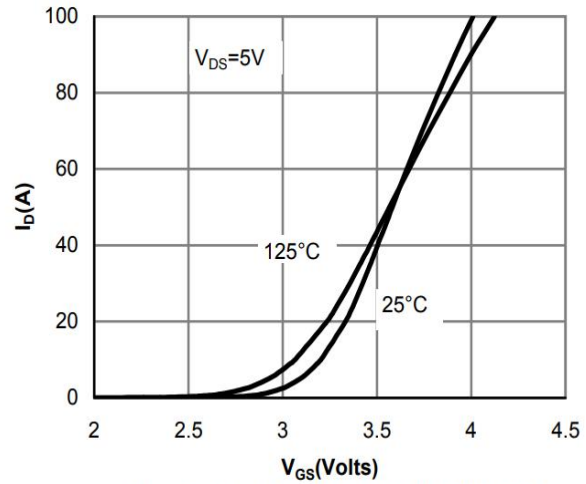


Figure 2: Transfer Characteristics (Note E)

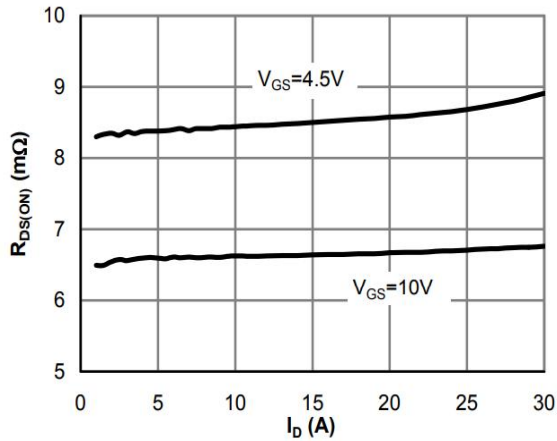


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

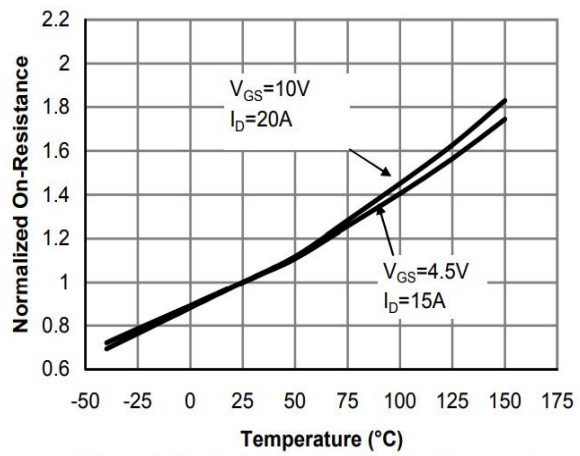


Figure 4: On-Resistance vs. Junction Temperature (Note E)

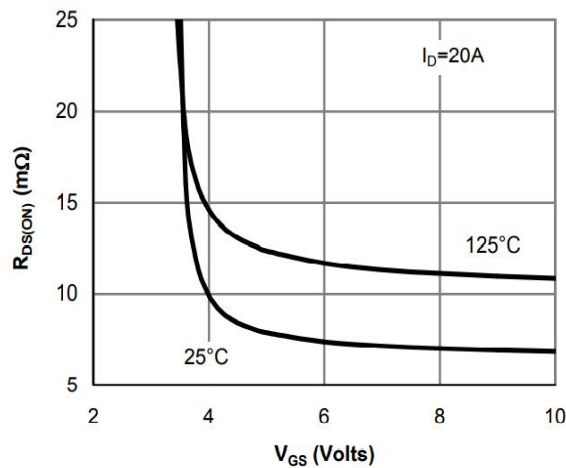


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

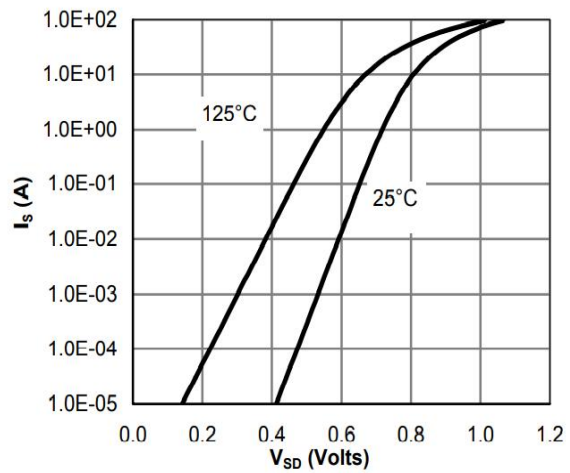


Figure 6: Body-Diode Characteristics (Note E)

Typical Electrical and Thermal Characteristics

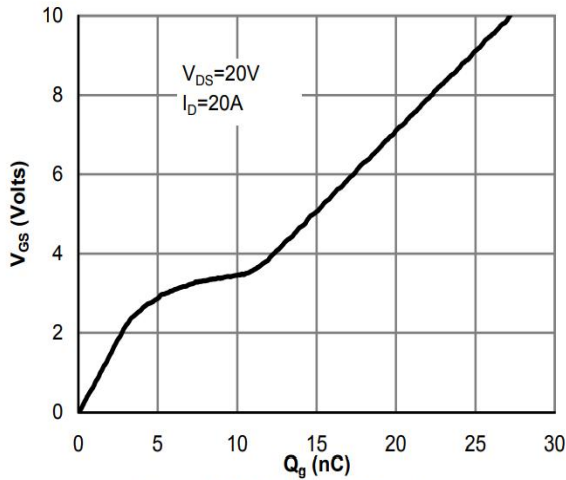


Figure 7: Gate-Charge Characteristics

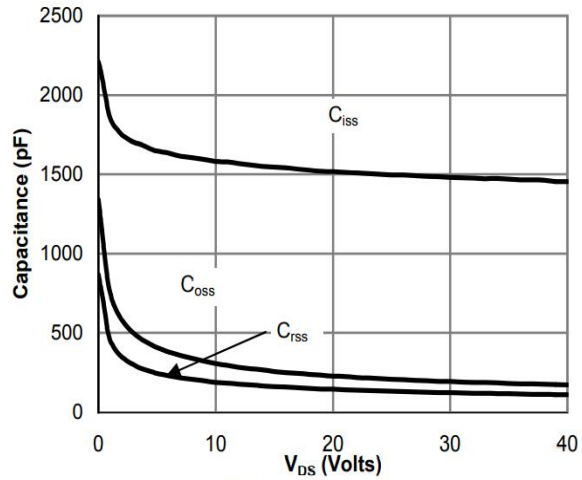


Figure 8: Capacitance Characteristics

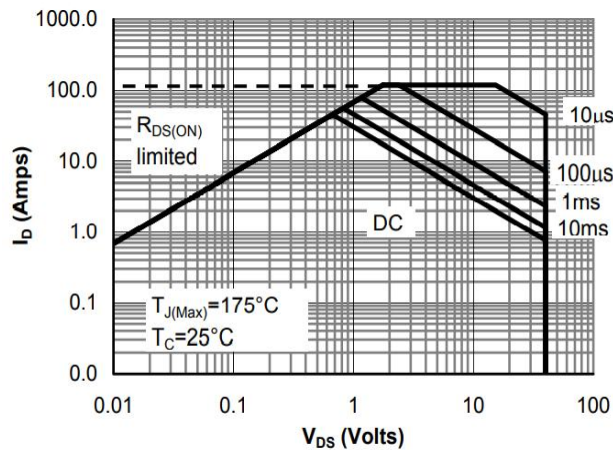


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

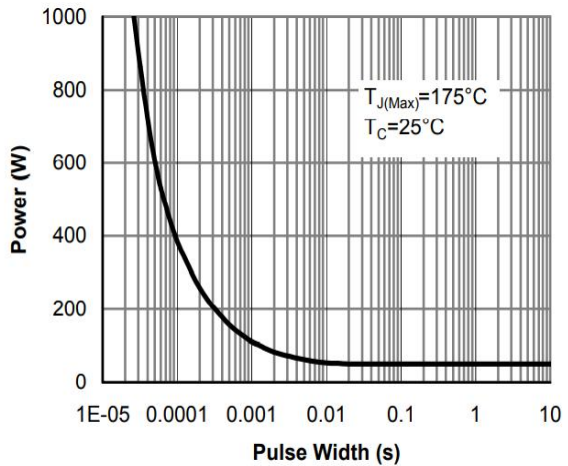


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

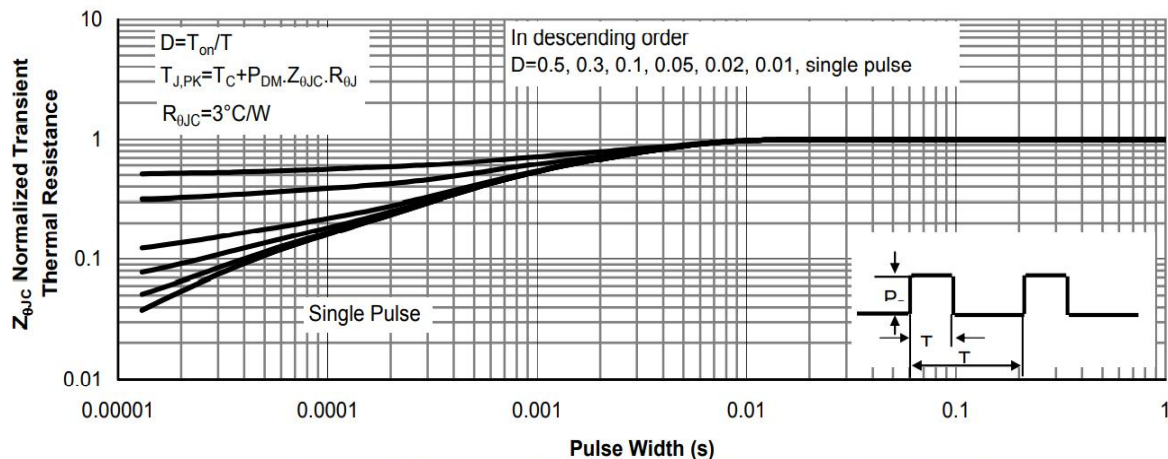
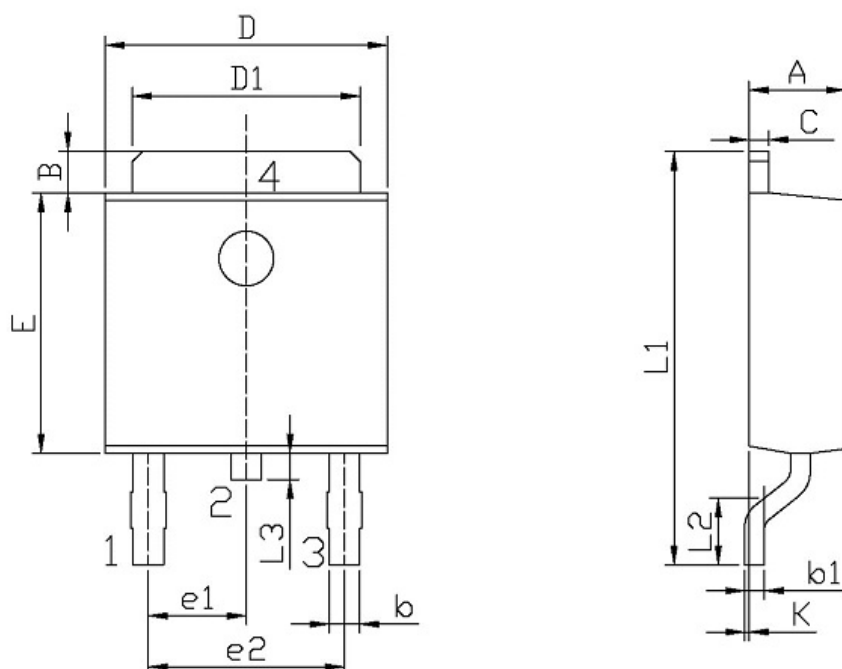


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

Package Mechanical Data

Unit : mm

TO-252(DPAK)



单位: mm

Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	2.20	2.40	E	5.95	6.25
B	0.95	1.25	e1	2.24	2.34
b	0.50	0.70	e2	4.43	4.73
b1	0.45	0.55	L1	9.45	9.95
C	0.45	0.55	L2	1.25	1.75
D	6.45	6.75	L3	0.60	0.90
D1	5.10	5.50	K	0.00	0.10