

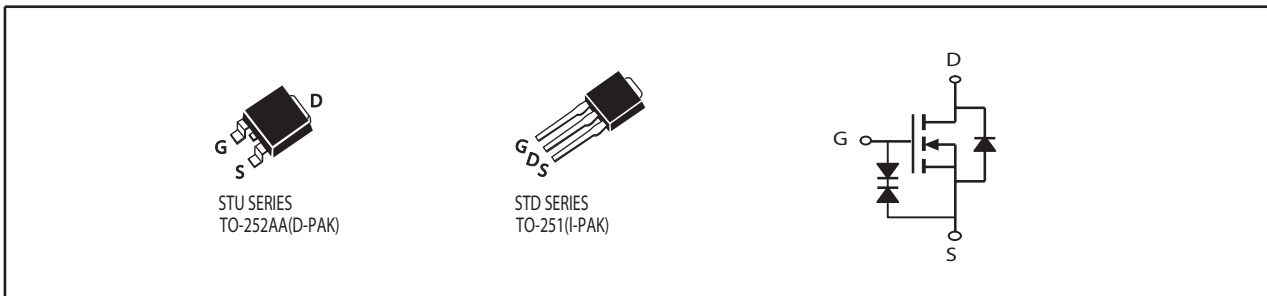


## N-Channel Logic Level Enhancement Mode Field Effect Transistor

PRODUCT SUMMARY		
V <sub>DSS</sub>	I <sub>D</sub>	R <sub>DS(ON)</sub> (mΩ) Max
40V	22A	26 @ V <sub>GS</sub> =10V
		40 @ V <sub>GS</sub> =4.5V

### FEATURES

- Super high dense cell design for low R<sub>DS(ON)</sub>.
- Rugged and reliable.
- TO-252 and TO-251 Package.
- ESD Protected.



ABSOLUTE MAXIMUM RATINGS (T <sub>C</sub> =25°C unless otherwise noted)			
Symbol	Parameter	Limit	Units
V <sub>DS</sub>	Drain-Source Voltage	40	V
V <sub>GS</sub>	Gate-Source Voltage	±20	V
I <sub>D</sub>	Drain Current-Continuous <sup>a</sup>	T <sub>A</sub> =25°C	22
		T <sub>A</sub> =70°C	17.5
I <sub>DM</sub>	-Pulsed <sup>b</sup>	80	A
E <sub>AS</sub>	Avalanche Energy <sup>c</sup>	10	mJ
P <sub>D</sub>	Maximum Power Dissipation <sup>a</sup>	T <sub>A</sub> =25°C	25
		T <sub>A</sub> =70°C	16
T <sub>J</sub> , T <sub>STG</sub>	Operating Junction and Storage Temperature Range	-55 to 150	°C

### THERMAL CHARACTERISTICS

R <sub>θ JC</sub>	Thermal Resistance, Junction-to-Case <sup>a</sup>	5	°C/W
R <sub>θ JA</sub>	Thermal Resistance, Junction-to-Ambient <sup>a</sup>	50	°C/W

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## ELECTRICAL CHARACTERISTICS (T<sub>C</sub>=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>OFF CHARACTERISTICS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V , I <sub>D</sub> =250μA	40			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =32V , V <sub>GS</sub> =0V			1	A
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>GS</sub> = ±20V , V <sub>DS</sub> =0V			±10	μA
<b>ON CHARACTERISTICS</b> <sup>a</sup>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1	1.8	3	V
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =10V , I <sub>D</sub> =11A		21	26	m ohm
		V <sub>GS</sub> =4.5V , I <sub>D</sub> =9A		30	40	m ohm
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =10V , I <sub>D</sub> =11A		15		S
<b>DYNAMIC CHARACTERISTICS</b> <sup>b</sup>						
C <sub>ISS</sub>	Input Capacitance	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V f=1.0MHz		470		pF
C <sub>OSS</sub>	Output Capacitance			91		pF
C <sub>RSS</sub>	Reverse Transfer Capacitance			53		pF
<b>SWITCHING CHARACTERISTICS</b> <sup>b</sup>						
t <sub>D(ON)</sub>	Turn-On DelayTime	V <sub>DD</sub> =20V I <sub>D</sub> =1A V <sub>GS</sub> =10V R <sub>GEN</sub> =6 ohm		8		ns
t <sub>r</sub>	Rise Time			12		ns
t <sub>D(OFF)</sub>	Turn-Off DelayTime			18		ns
t <sub>f</sub>	Fall Time			19		ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =20V, I <sub>D</sub> =11A, V <sub>GS</sub> =10V		7.6		nC
		V <sub>DS</sub> =20V, I <sub>D</sub> =11A, V <sub>GS</sub> =4.5V		4		nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =20V, I <sub>D</sub> =11A, V <sub>GS</sub> =10V		1.4		nC
Q <sub>gd</sub>	Gate-Drain Charge			2.2		nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS</b>						
I <sub>S</sub>	Maximum Continuous Drain-Source Diode Forward Current				2.0	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =2.0A		0.79	1.3	V

### Notes

- Surface Mounted on FR4 Board, t<sub>≤</sub>10 sec.
- Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
- Guaranteed by design, not subject to production testing.
- Starting T<sub>J</sub>=25°C, L=0.5mH, R<sub>G</sub>=25Ω, V<sub>DD</sub>=20V, V<sub>GS</sub>=10V. (See Figure 13)

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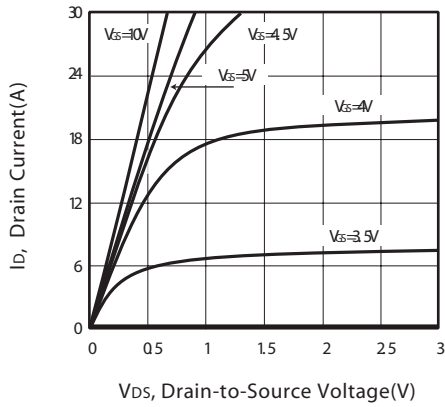


Figure 1. Output Characteristics

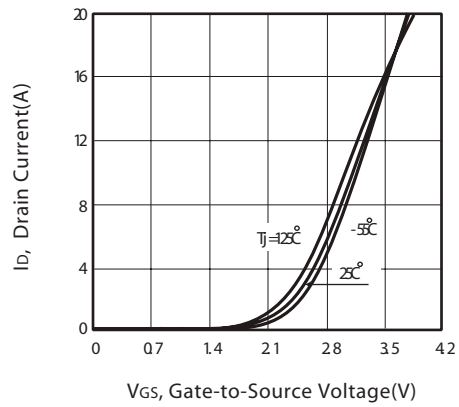


Figure 2. Transfer Characteristics

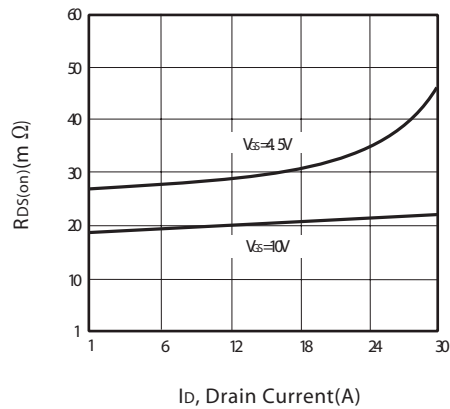


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

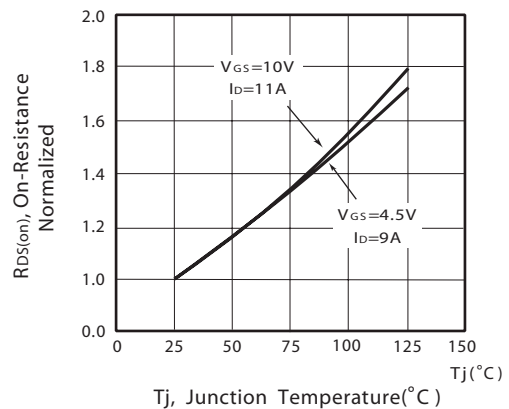


Figure 4. On-Resistance Variation with Drain Current and Temperature

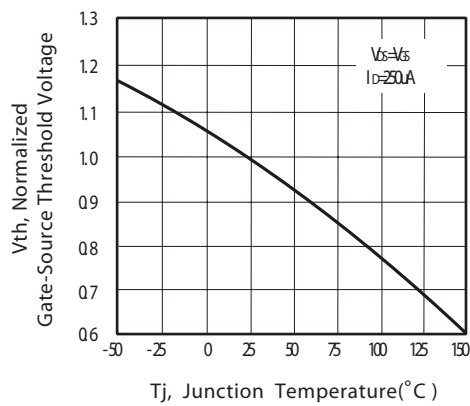


Figure 5. Gate Threshold Variation with Temperature

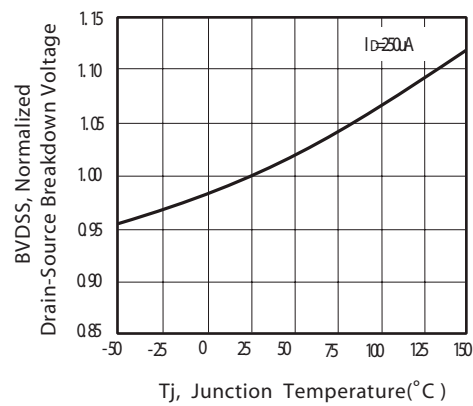


Figure 6. Breakdown Voltage Variation with Temperature

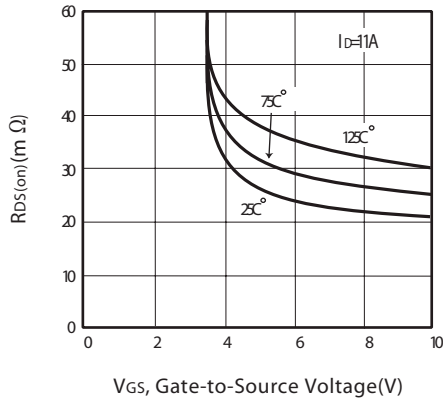


Figure 7. On-Resistance vs. Gate-Source Voltage

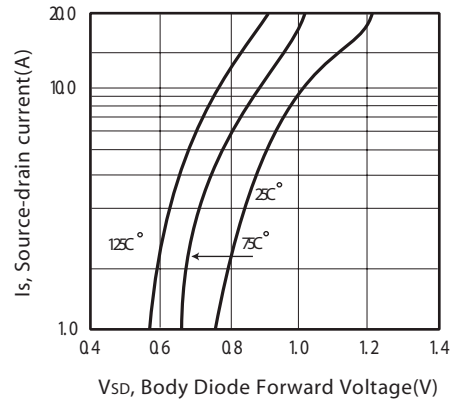


Figure 8. Body Diode Forward Voltage Variation with Source Current

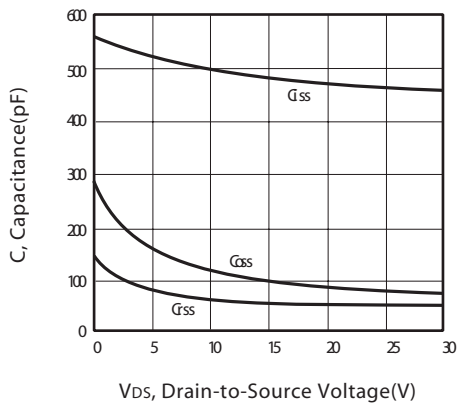


Figure 9. Capacitance

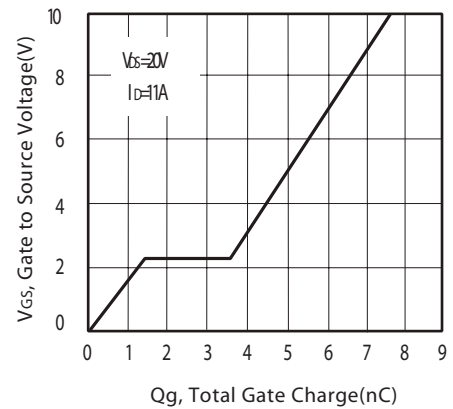


Figure 10. Gate Charge

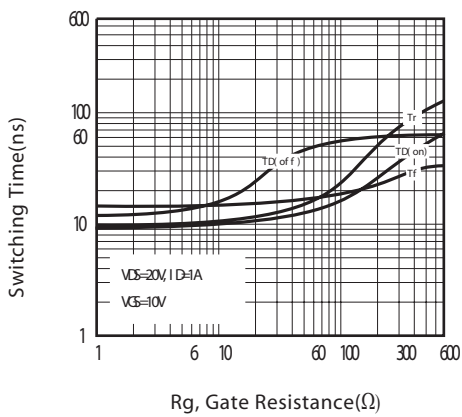


Figure 11. switching characteristics

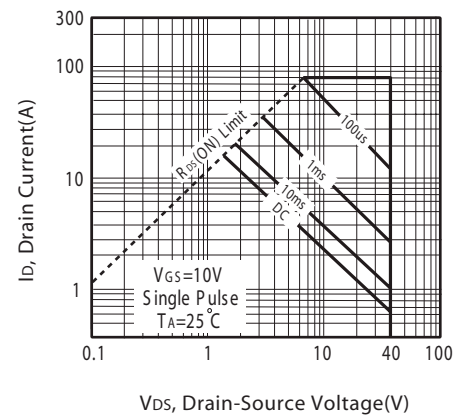
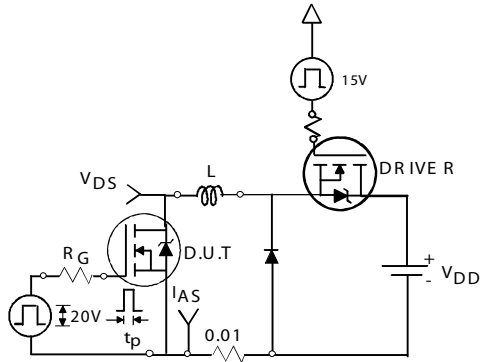
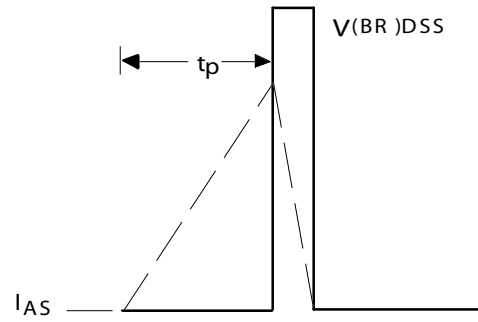


Figure 12. Maximum Safe Operating Area



Unclamped Inductive Test Circuit

Figure 13a.



Unclamped Inductive Waveforms

Figure 13b.

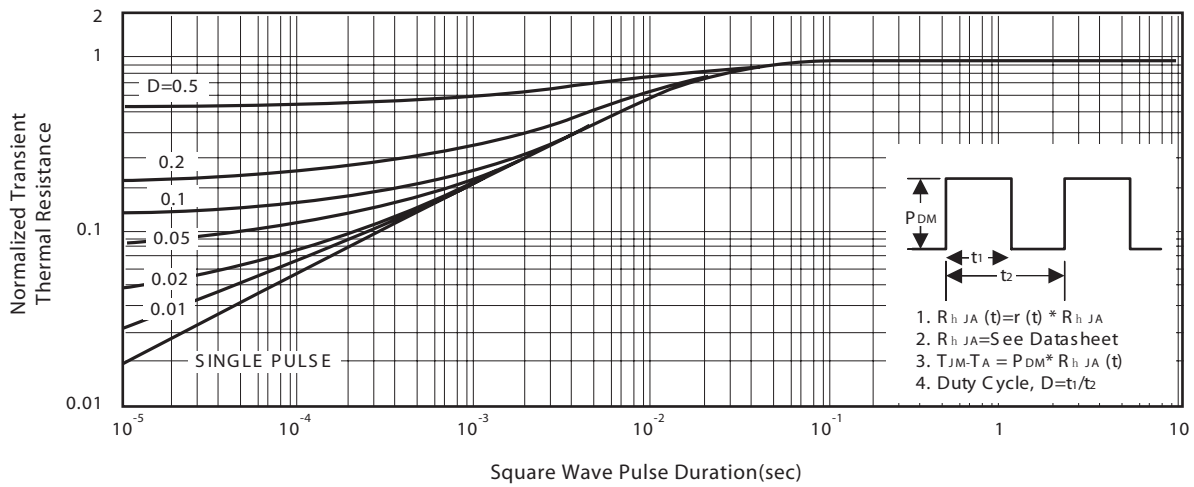
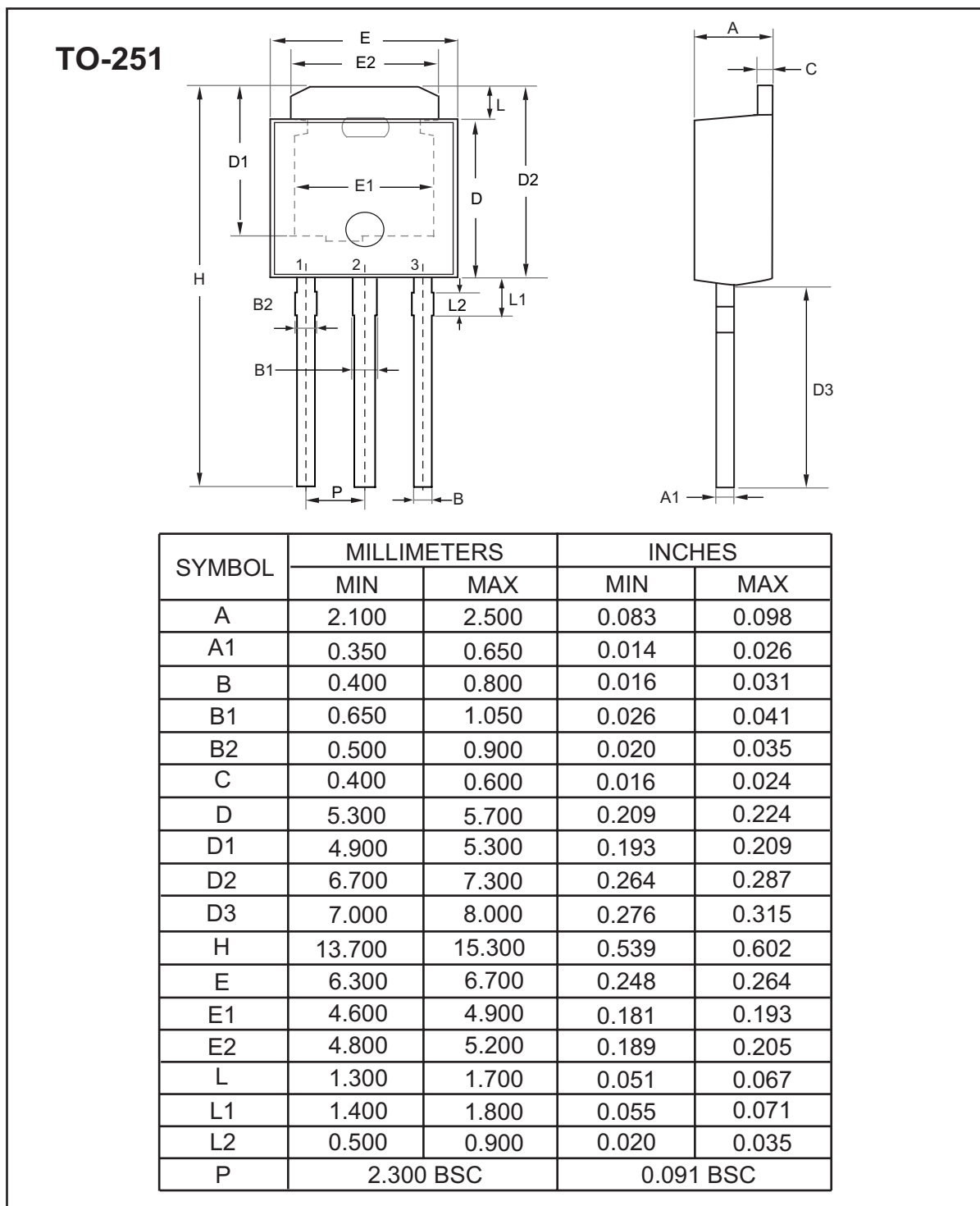


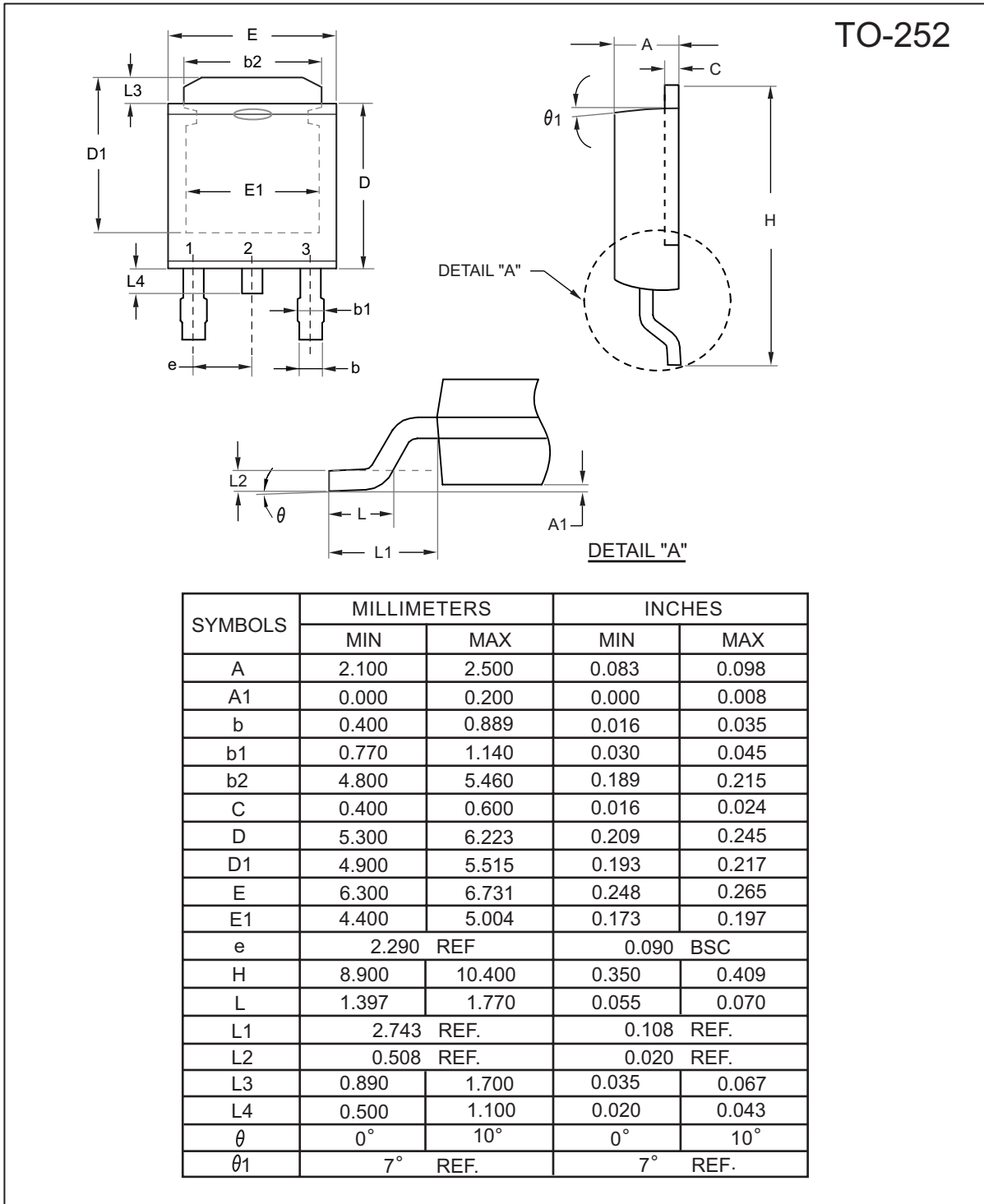
Figure 14. Normalized Thermal Transient Impedance Curve

## PACKAGE OUTLINE DIMENSIONS



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## TO-251 Tube/TO-252 Tape and Reel Data

### TO-251 Tube



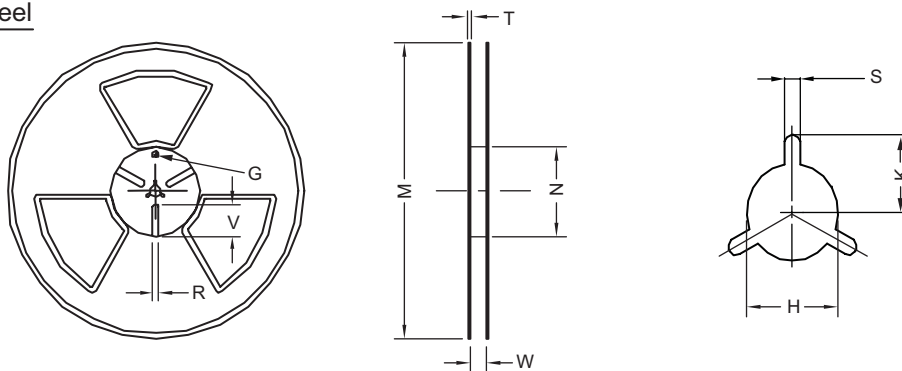
### TO-252 Carrier Tape



UNIT:mm

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
TO-252 (16 mm)	6.96 ±0.1	10.49 ±0.1	2.79 ±0.1	φ 2	φ 1.5 + 0.1 - 0	16.0 ±0.3	1.75 ±0.1	7.5 ±0.15	8.0 ±0.1	4.0 ±0.1	2.0 ±0.15	0.3 ±0.05

### TO-252 Reel



UNIT:mm

TAPE SIZE	REEL SIZE	M	N	W	T	H	K	S	G	R	V
16 mm	φ 330	φ 330 ± 0.5	φ 97 ± 1.0	17.0 + 1.5 - 0	2.2	φ 13.0 + 0.5 - 0.2	10.6	2.0 ±0.5	---	---	---