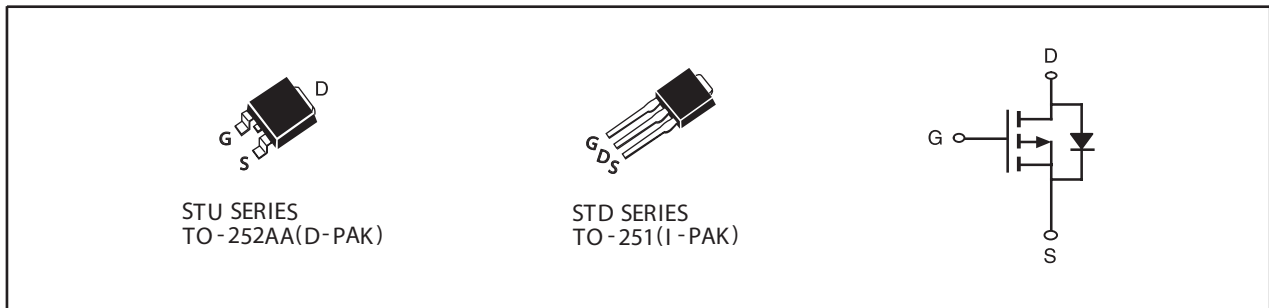


**P-Channel Logic Level Enhancement Mode Field Effect Transistor****PRODUCT SUMMARY**

VDSS	ID	RDS(ON) (mΩ) Max
-40V	-34A	16 @ VGS=-10V
		26 @ VGS=-4.5V

**FEATURES**

- Super high dense cell design for low RDS(ON).
- Rugged and reliable.
- Surface Mount Package.

**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	T <sub>C</sub> =25°C	-34
		T <sub>C</sub> =70°C	-27.2
I <sub>DM</sub>	-Pulsed <sup>a</sup>	-103	A
E <sub>AS</sub>	Single Pulse Avalanche Energy <sup>c</sup>	132	mJ
P <sub>D</sub>	Maximum Power Dissipation	T <sub>C</sub> =25°C	42
		T <sub>C</sub> =70°C	27
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	3	°C/W
R <sub>θ JA</sub>	Thermal Resistance, Junction-to-Ambient	50	°C/W

# STU/D417L

Ver 1.1

## 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> =-250uA	-40			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-32V , V <sub>GS</sub> =0V			1	uA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> = ±20V , V <sub>DS</sub> =0V			±100	nA
<b>ON CHARACTERISTICS</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA	-1	-1.9	-3	V
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =-10V , I <sub>D</sub> =-17A		13	16	m ohm
		V <sub>GS</sub> =-4.5V , I <sub>D</sub> =-13A		19	26	m ohm
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =-10V , I <sub>D</sub> =-17A		28		S
<b>DYNAMIC CHARACTERISTICS <sup>b</sup></b>						
C <sub>ISS</sub>	Input Capacitance	V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V f=1.0MHz		1840		pF
C <sub>OSS</sub>	Output Capacitance			280		pF
C <sub>RSS</sub>	Reverse Transfer Capacitance			173		pF
<b>SWITCHING CHARACTERISTICS <sup>b</sup></b>						
t <sub>D(ON)</sub>	Turn-On Delay Time	V <sub>DD</sub> =-20V I <sub>D</sub> =-1.0A V <sub>GS</sub> =-10V R <sub>GEN</sub> = 6 ohm		26		ns
t <sub>r</sub>	Rise Time			33		ns
t <sub>D(OFF)</sub>	Turn-Off Delay Time			115		ns
t <sub>f</sub>	Fall Time			34		ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =-20V, I <sub>D</sub> =-17A, V <sub>GS</sub> =-10V		34		nC
		V <sub>DS</sub> =-20V, I <sub>D</sub> =-17A, V <sub>GS</sub> =-4.5V		16		nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =-20V, I <sub>D</sub> =-17A, V <sub>GS</sub> =-10V		4		nC
Q <sub>gd</sub>	Gate-Drain Charge			9.4		nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS</b>						
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> = -3A		-0.75	-1.3	V

### Notes

- a. Pulse Test: Pulse Width ≤ 300us, Duty Cycle ≤ 2%.  
 b. Guaranteed by design, not subject to production testing.  
 c. Starting T<sub>J</sub>=25°C, L=0.5mH, V<sub>DD</sub> = 20V .(See Figure13)

Aug,24,2012

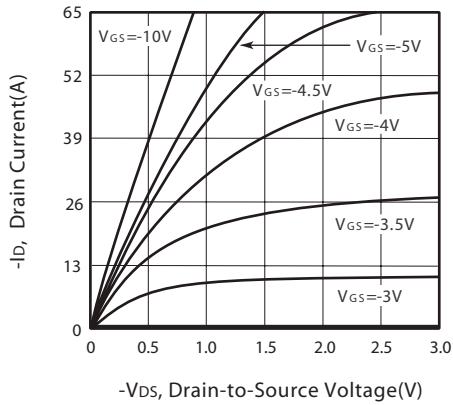


Figure 1. Output Characteristics

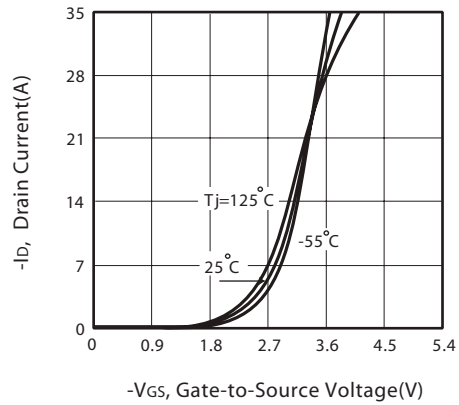


Figure 2. Transfer Characteristics

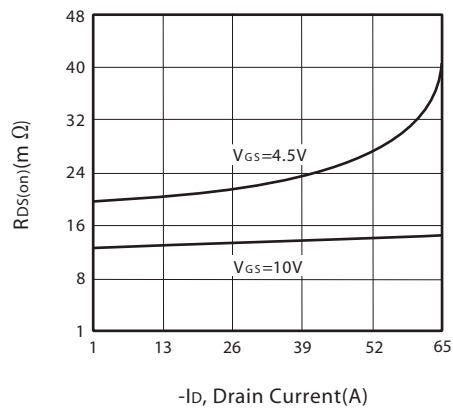


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

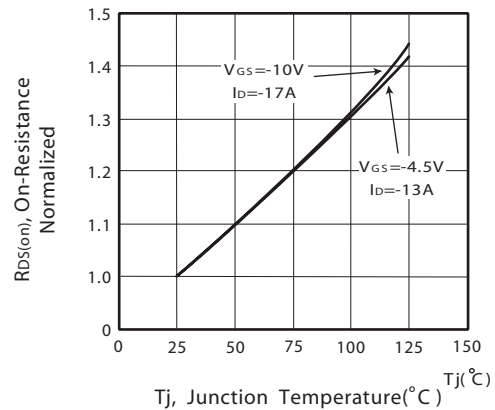


Figure 4. On-Resistance Variation with Drain Current and Temperature

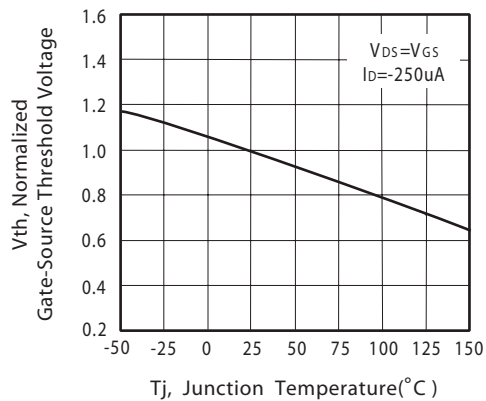


Figure 5. Gate Threshold Variation with Temperature

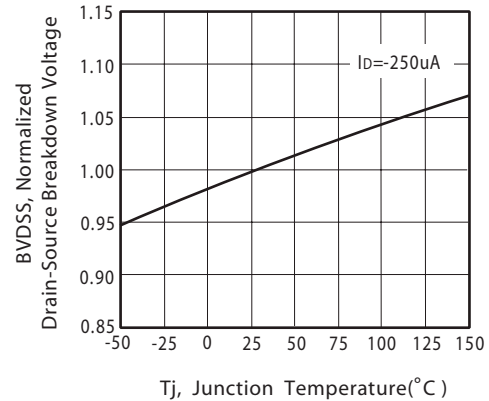


Figure 6. Breakdown Voltage Variation with Temperature

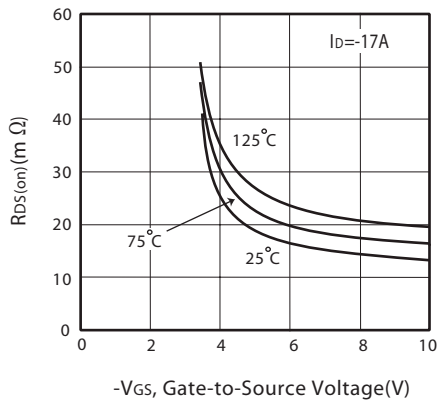


Figure 7. On-Resistance vs. Gate-Source Voltage

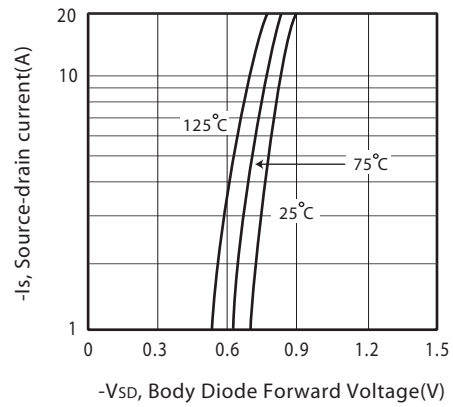


Figure 8. Body Diode Forward Voltage Variation with Source Current

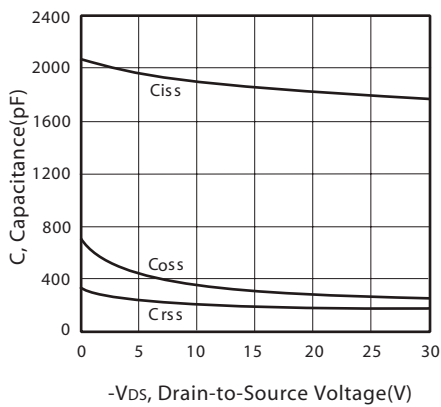


Figure 9. Capacitance

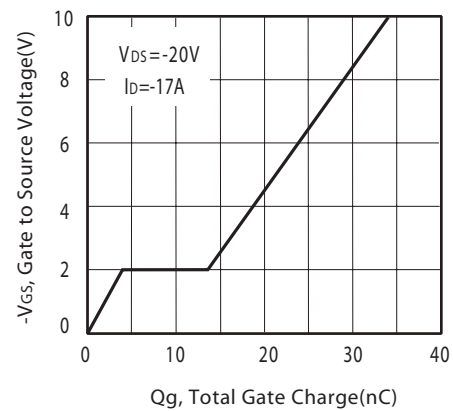


Figure 10. Gate Charge

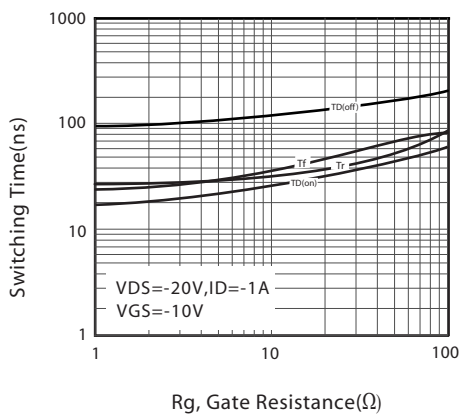


Figure 11. switching characteristics

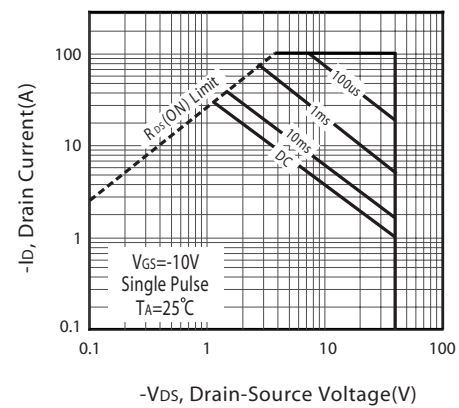
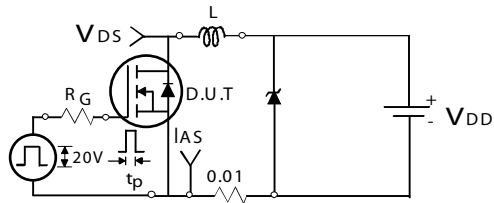
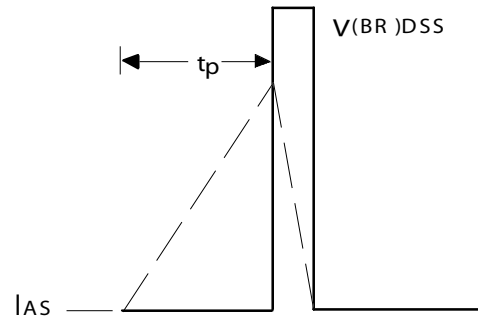


Figure 12. Maximum Safe Operating Area



Unclamped Inductive Test Circuit

Figure 13a.



Unclamped Inductive Waveforms

Figure 13b.

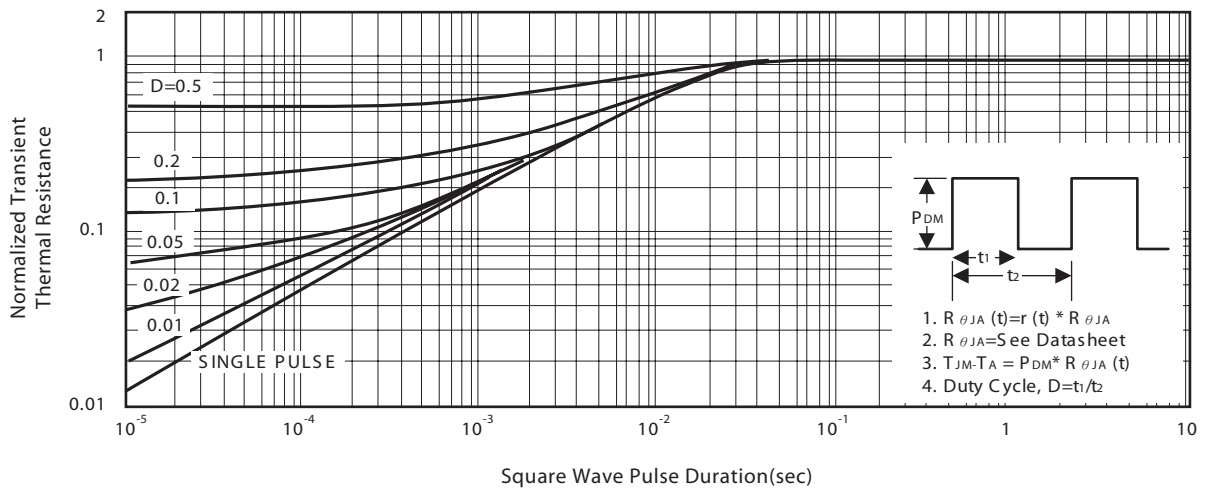
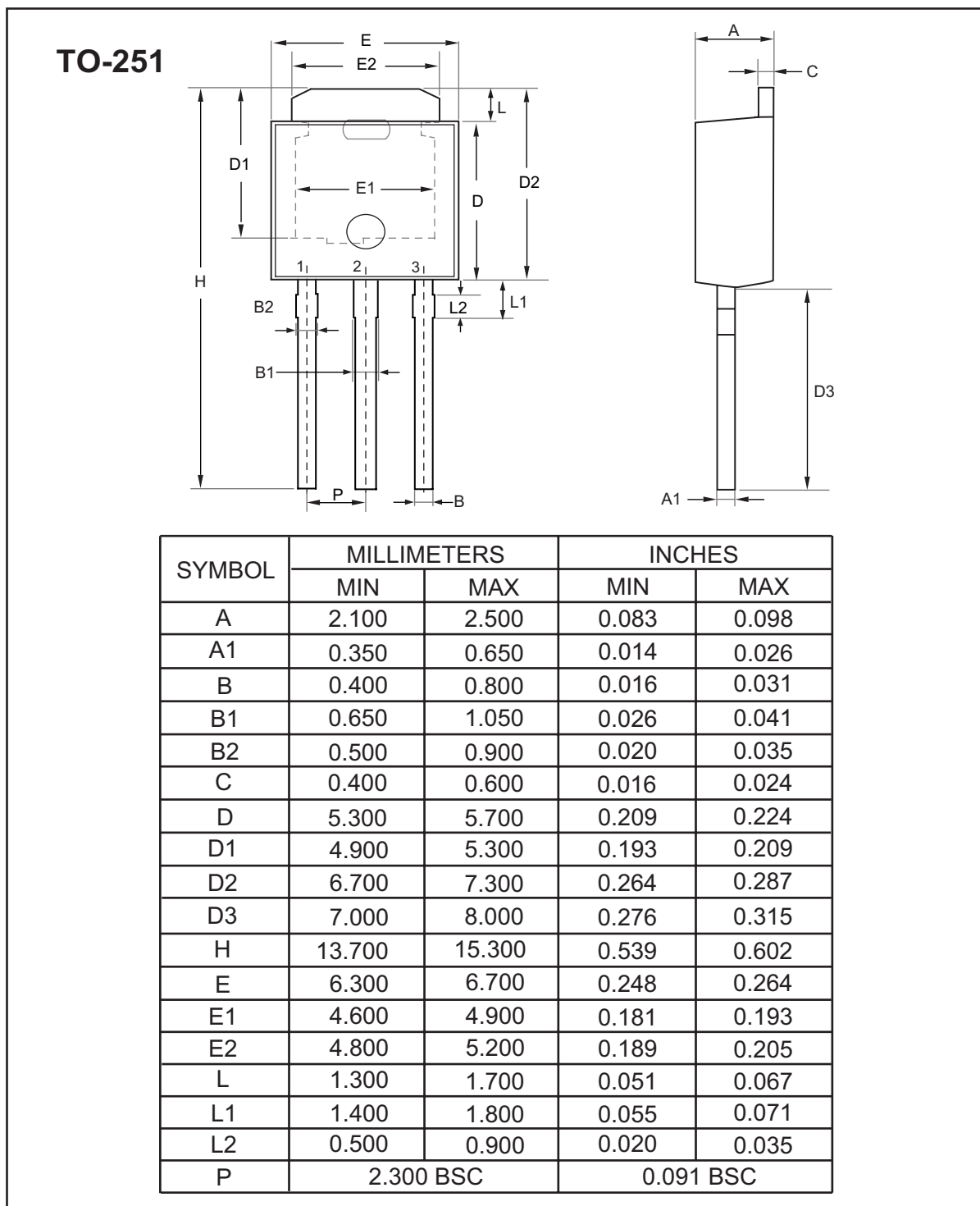
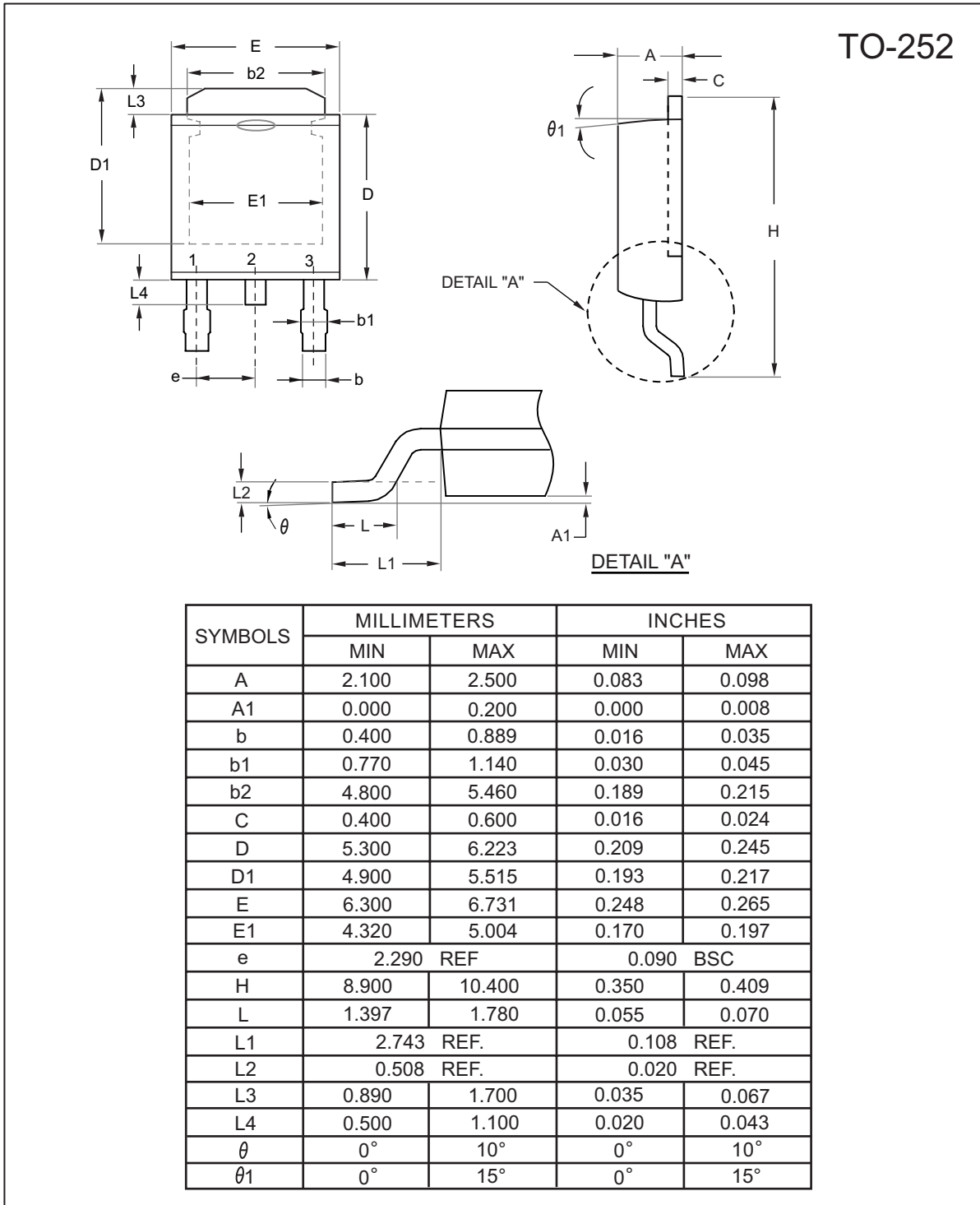


Figure 14. Normalized Thermal Transient Impedance Curve

## PACKAGE OUTLINE DIMENSIONS



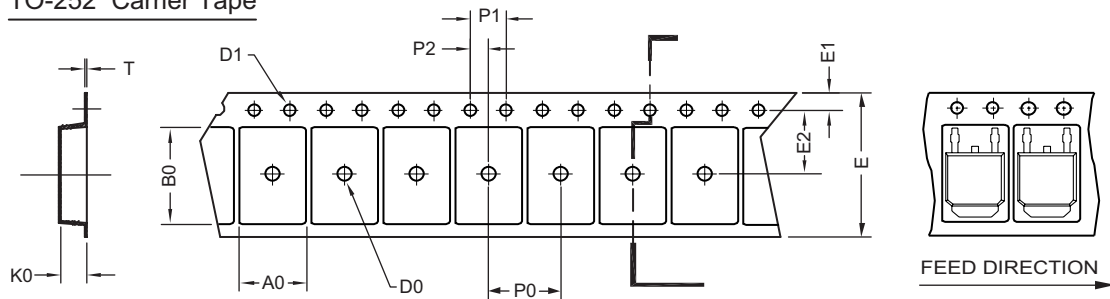


## TO-251 Tube/TO-252 Tape and Reel Data

### TO-251 Tube



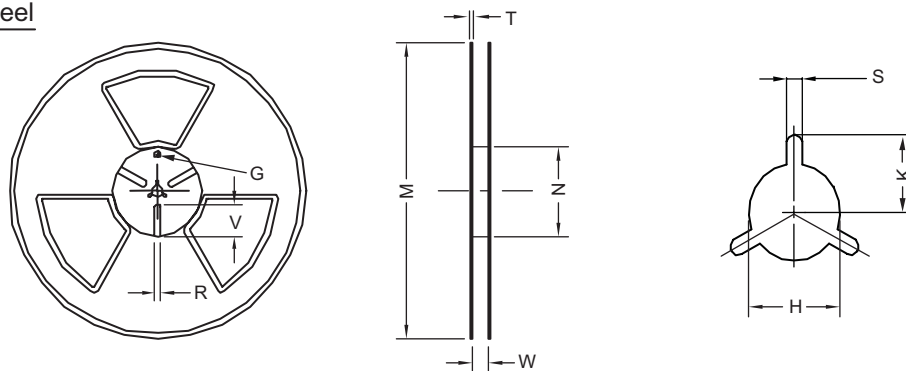
### TO-252 Carrier Tape



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	---	---	---