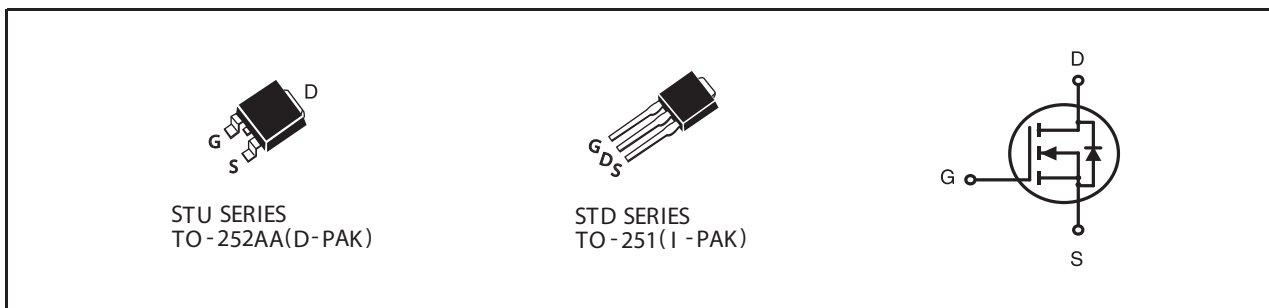


**N-Channel Logic Level Enhancement Mode Field Effect Transistor****PRODUCT SUMMARY**

VDSS	ID	RDS(ON) (mΩ) Max
60V	21A	56 @ VGS=10V
		70 @ VGS=4.5V

FEATURES

- Super high dense cell design for low RDS(ON).
- Rugged and reliable.
- TO-252 and TO-251 Package.

**ABSOLUTE MAXIMUM RATINGS (TA=25°C unless otherwise noted)**

Symbol	Parameter	Limit	Units
V _{DS}	Drain-Source Voltage	60	V
V _{GS}	Gate-Source Voltage	±20	V
I _D	Drain Current-Continuous ^a	T _C =25°C	21
		T _C =70°C	16.8
I _{DM}	-Pulsed ^b	60	A
E _{AS}	Single Pulse Avalanche Energy ^d	36	mJ
P _D	Maximum Power Dissipation ^a	T _C =25°C	60
		T _C =70°C	42
T _J , T _{STG}	Operating Junction and Storage Temperature Range	-55 to 175	°C

THERMAL CHARACTERISTICS

R _{θJC}	Thermal Resistance, Junction-to-Case ^a	2.5	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient ^a	50	°C/W

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ELECTRICAL CHARACTERISTICS (TA=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	60			V
BV _{DSS}	Drain-Source Breakdown Voltage ^e	V _{GS} =0V, I _D =10mA	66			
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =48V, V _{GS} =0V			1	uA
I _{GSS}	Gate-Body Leakage Current	V _{GS} = ±20V, V _{DS} =0V			±100	nA
ON CHARACTERISTICS						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	1.5	2	3	V
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =10V, I _D =10.5A		45	56	m ohm
		V _{GS} =4.5V, I _D =9.4A		52	70	m ohm
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =10.5A		28		S
DYNAMIC CHARACTERISTICS^c						
C _{ISS}	Input Capacitance	V _{DS} =30V, V _{GS} =0V f=1.0MHz		1070		pF
C _{OSS}	Output Capacitance			66		pF
C _{RSS}	Reverse Transfer Capacitance			54		pF
SWITCHING CHARACTERISTICS^c						
t _{D(ON)}	Turn-On Delay Time	V _{DD} =30V I _D =1A V _{GS} =10V R _{GEN} = 6 ohm		20		ns
t _r	Rise Time			16		ns
t _{D(OFF)}	Turn-Off Delay Time			42		ns
t _f	Fall Time			9		ns
Q _g	Total Gate Charge	V _{DS} =30V, I _D =10.5A, V _{GS} =10V		18.5		nC
		V _{DS} =30V, I _D =10.5A, V _{GS} =4.5V		9.1		nC
Q _{gs}	Gate-Source Charge	V _{DS} =30V, I _D =10.5A, V _{GS} =10V		2.6		nC
Q _{gd}	Gate-Drain Charge			4.7		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
I _S	Maximum Continuous Drain-Source Diode Forward Current				2	A
V _{SD}	Diode Forward Voltage ^b	V _{GS} =0V, I _S =2A		0.79	1.3	V

Notes

- Surface Mounted on FR4 Board, t ≤ 10sec.
- Pulse Test: Pulse Width ≤ 300us, Duty Cycle ≤ 2%.
- Guaranteed by design, not subject to production testing.
- Starting T_J=25°C, L=0.5mH, V_{DD} = 30V. (See Figure13)
- Pulse Test: Pulse Width < 1us, Duty Cycle < 1%.

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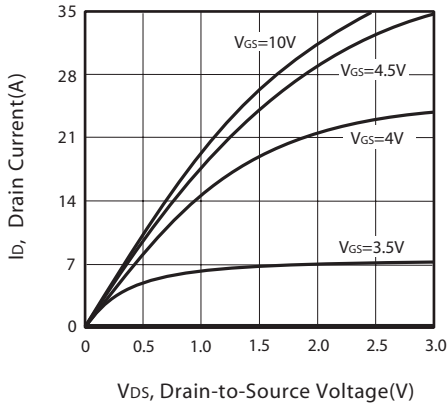


Figure 1. Output Characteristics

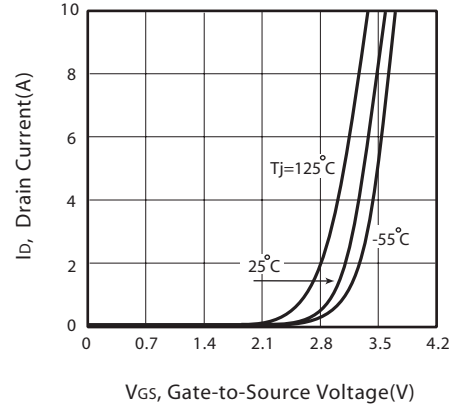


Figure 2. Transfer Characteristics

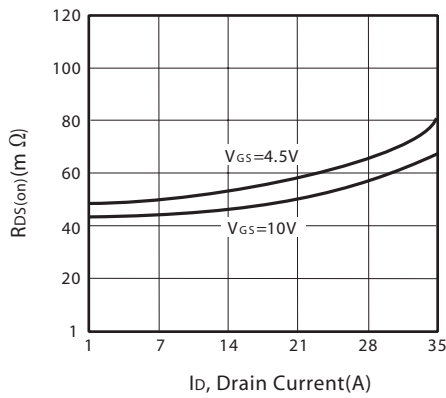


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

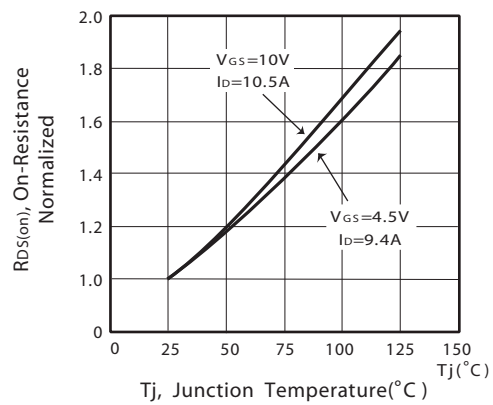


Figure 4. On-Resistance Variation with Drain Current and Temperature

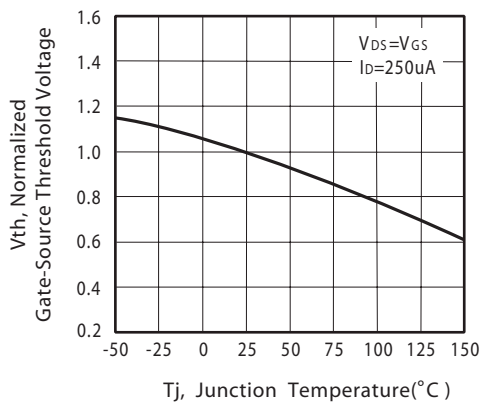


Figure 5. Gate Threshold Variation with Temperature

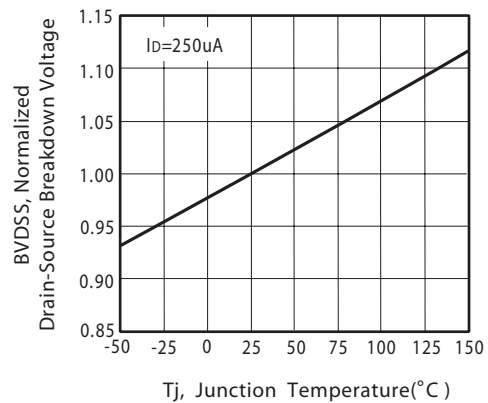


Figure 6. Breakdown Voltage Variation with Temperature

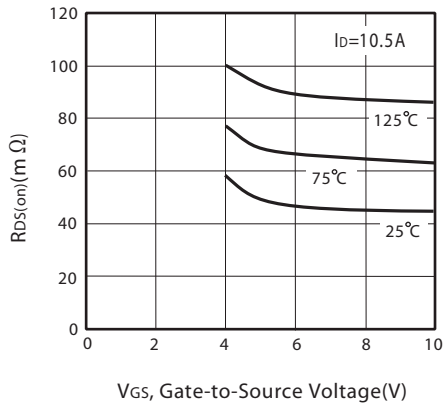


Figure 7. On-Resistance vs. Gate-Source Voltage

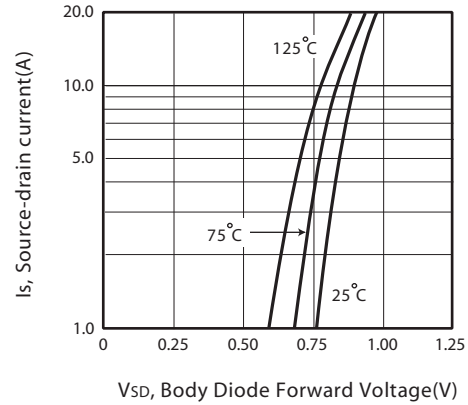


Figure 8. Body Diode Forward Voltage Variation with Source Current

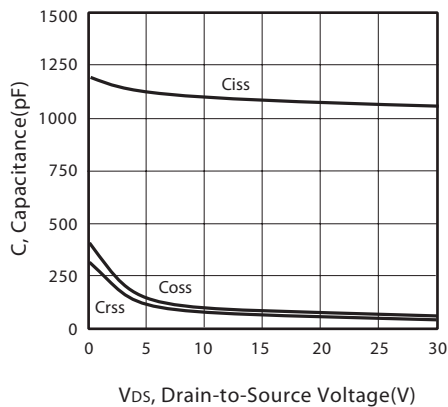


Figure 9. Capacitance

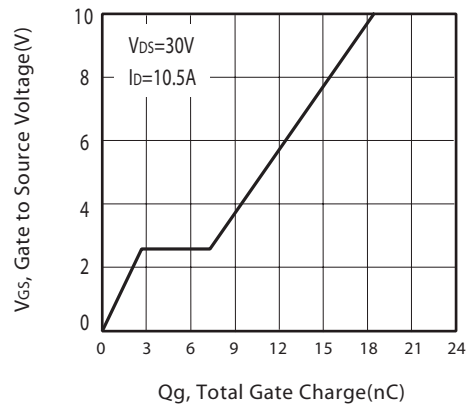


Figure 10. Gate Charge

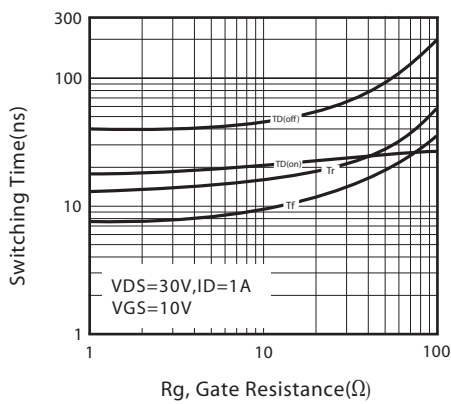


Figure 11. switching characteristics

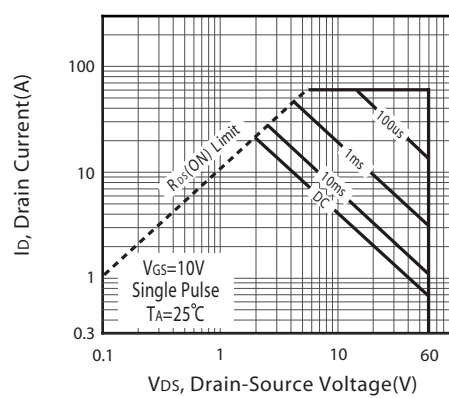
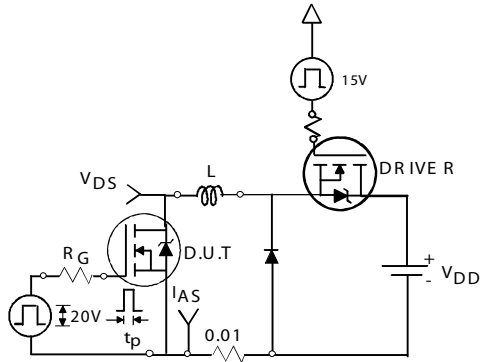
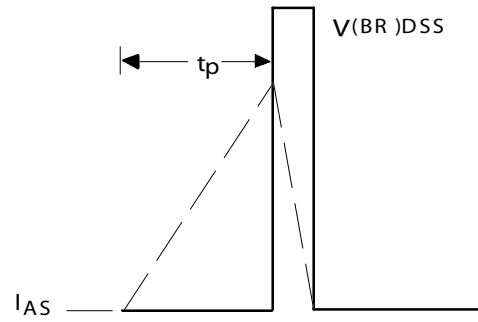


Figure 12. Maximum Safe Operating Area



Unclamped Inductive Test Circuit

Figure 13a.



Unclamped Inductive Waveforms

Figure 13b.

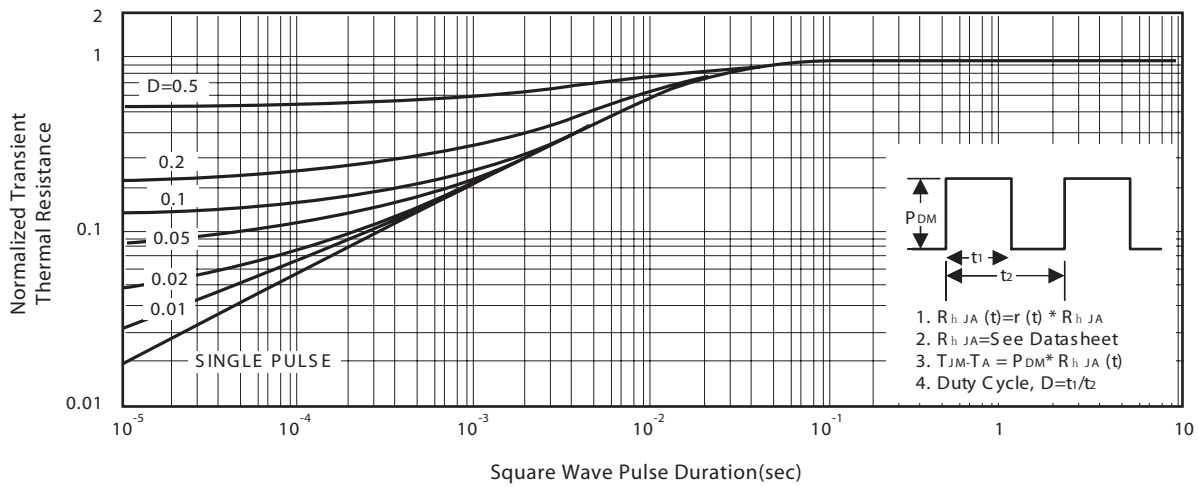
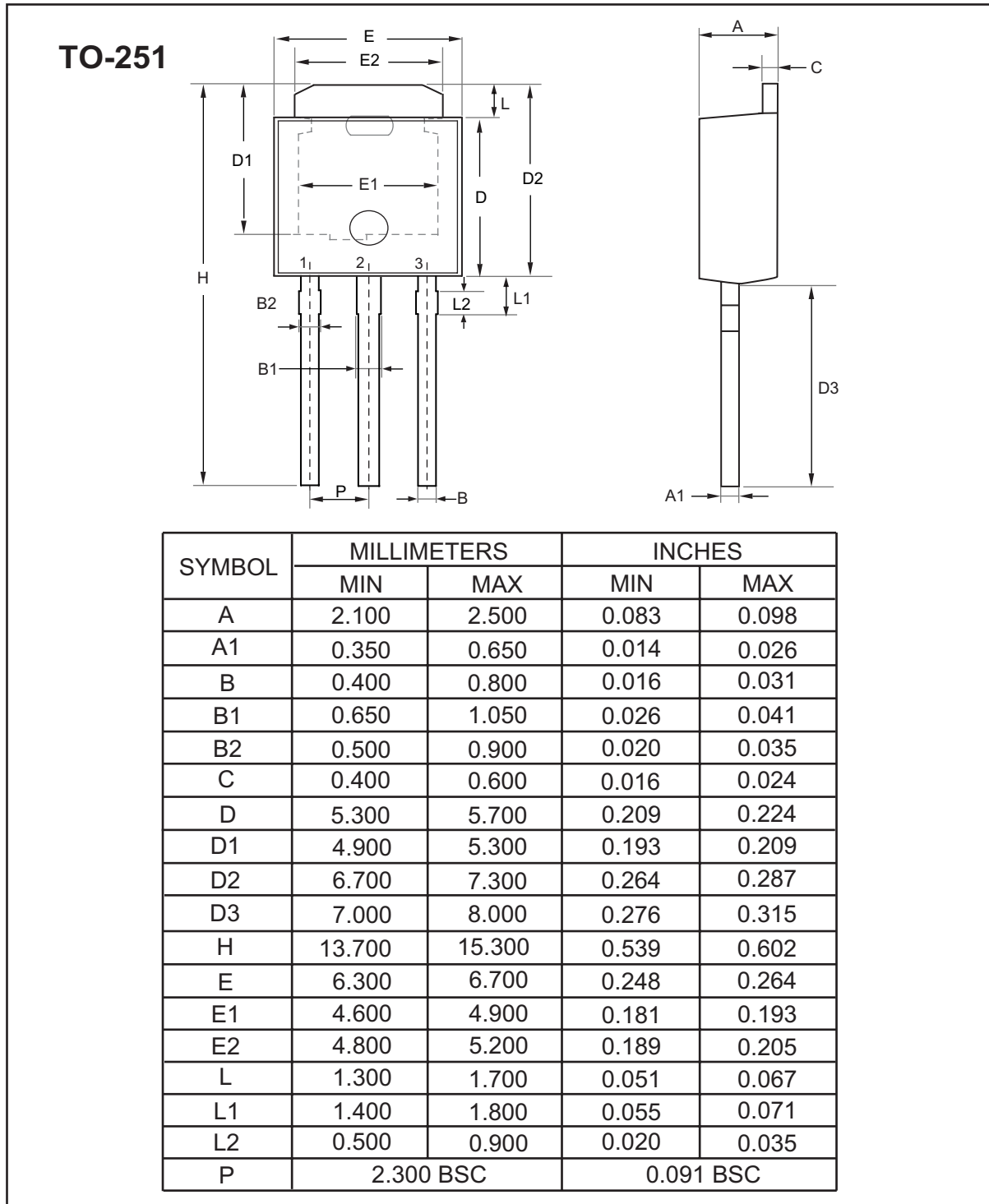


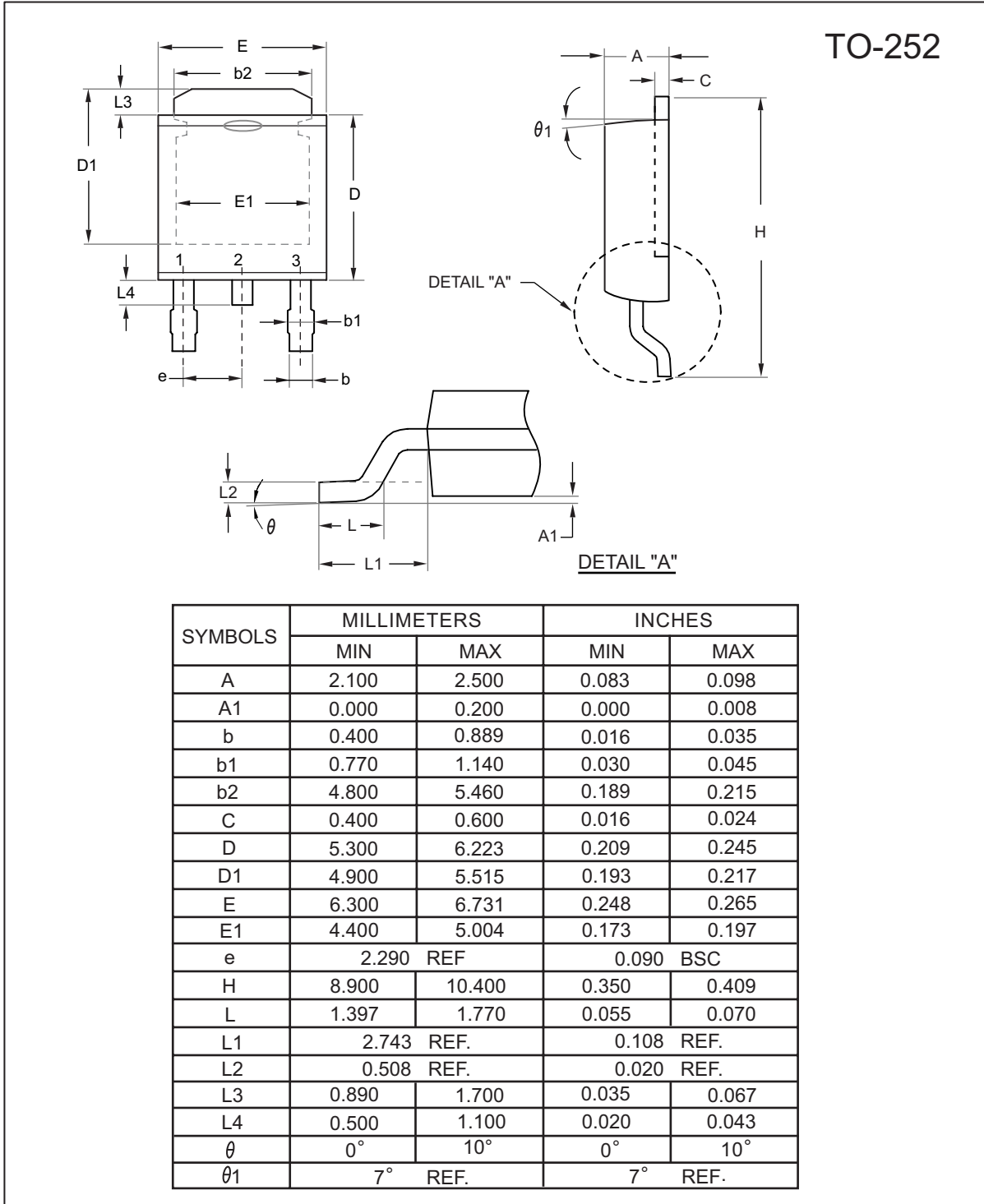
Figure 14. Normalized Thermal Transient Impedance Curve

PACKAGE OUTLINE DIMENSIONS



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

TO-251 Tube



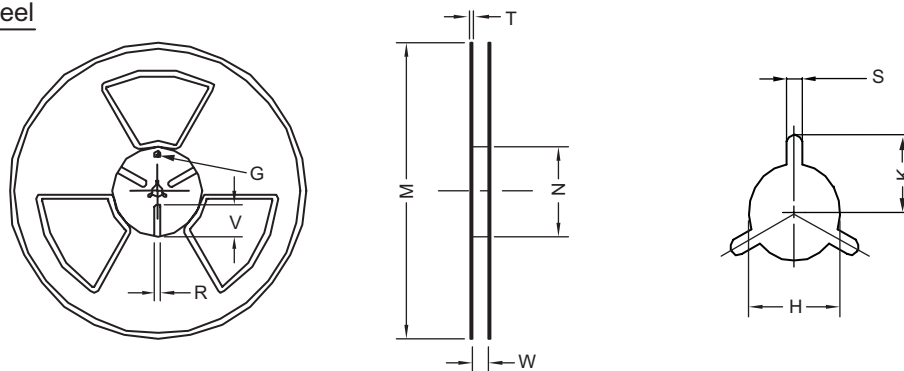
TO-252 Carrier Tape



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	---	---	---