

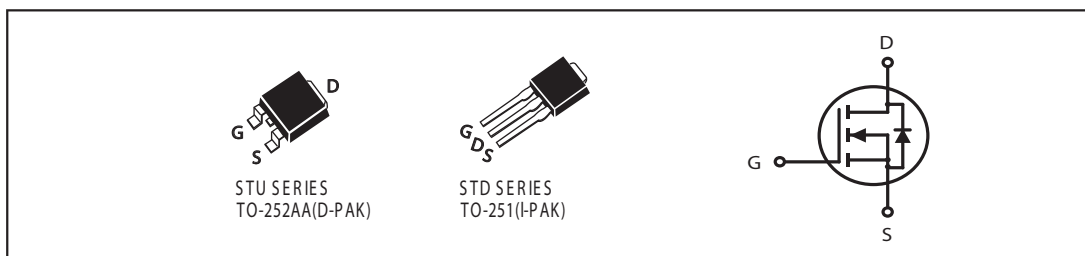


## N-Channel Logic Level Enhancement Mode Field Effect Transistor

PRODUCT SUMMARY		
V <sub>DSS</sub>	I <sub>D</sub>	R <sub>DS(ON)</sub> (mΩ) Max
30V	30A	18 @ V <sub>GS</sub> = 10V
		25 @ 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.

ABSOLUTE MAXIMUM RATINGS (T<sub>a</sub>=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V <sub>DS</sub>	30	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Drain Current-Continuous @ T <sub>c</sub> =25°C -Pulsed <sup>a</sup>	I <sub>D</sub>	30	A
	I <sub>DM</sub>	75	A
Drain-Source Diode Forward Current	I <sub>S</sub>	20	A
Maximum Power Dissipation @ T <sub>c</sub> =25°C	P <sub>D</sub>	50	W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to 175	°C

## THERMAL CHARACTERISTICS

Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>	3	°C/W
Thermal Resistance, Junction-to-Ambient	R <sub>θJA</sub>	50	°C/W

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

Parameter	Symbol	Condition	Min	Typ <sup>c</sup>	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250uA	30			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V			1	uA
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V			±100	nA
<b>ON CHARACTERISTICS<sup>a</sup></b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250uA	1	1.7	3	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A		13	18	m ohm
		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 12A		18	25	m ohm
On-State Drain Current	I <sub>D(ON)</sub>	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 10V	50			A
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = 10V, I <sub>D</sub> = 20A		25		S
<b>DYNAMIC CHARACTERISTICS<sup>b</sup></b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V f = 1.0MHz		830		pF
Output Capacitance	C <sub>OSS</sub>			180		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			120		pF
Gate resistance	R <sub>g</sub>	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V, f = 1.0MHz		3		ohm
<b>SWITCHING CHARACTERISTICS<sup>b</sup></b>						
Turn-On Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> = 15V I <sub>D</sub> = 1 A V <sub>GS</sub> = 10V R <sub>GEN</sub> = 6 ohm		11		ns
Rise Time	t <sub>r</sub>			16		ns
Turn-Off Delay Time	t <sub>D(OFF)</sub>			35		ns
Fall Time	t <sub>f</sub>			10		ns
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 15V, I <sub>D</sub> = 20A, V <sub>GS</sub> = 10V		17		nC
		V <sub>DS</sub> = 15V, I <sub>D</sub> = 20A, V <sub>GS</sub> = 4.5V		9		nC
Gate-Source Charge	Q <sub>gs</sub>	V <sub>DS</sub> = 15V, I <sub>D</sub> = 20A		1.8		nC
Gate-Drain Charge	Q <sub>gd</sub>	V <sub>GS</sub> = 10V		5		nC

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## ELECTRICAL CHARACTERISTICS ( $T_c=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>DRAIN-SOURCE DIODE CHARACTERISTICS <sup>a</sup></b>						
Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0V, I_s = 10A$		0.97	1.3	V

### Notes

- a. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.

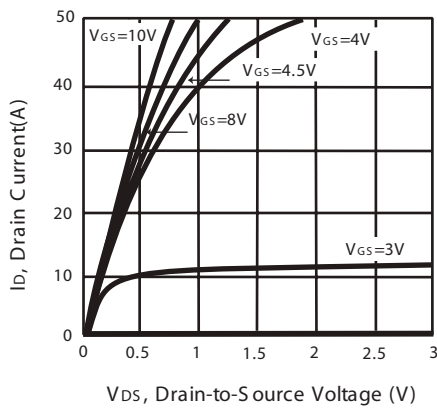


Figure 1. Output C characteristics

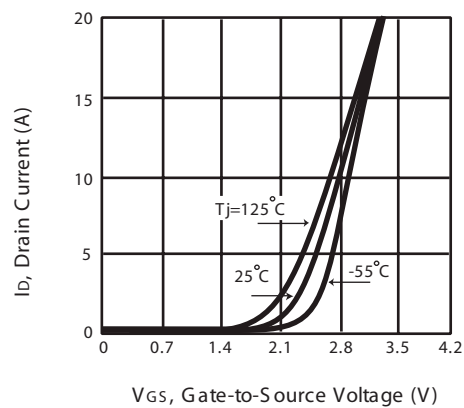


Figure 2. Transfer C characteristics

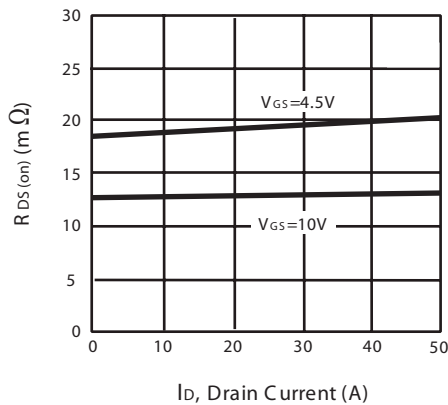


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

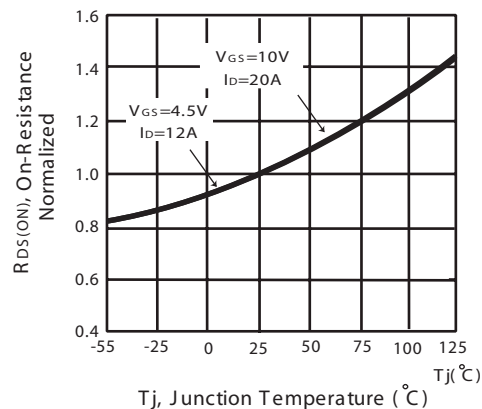


Figure 4. On-Resistance VS Junction Temperature

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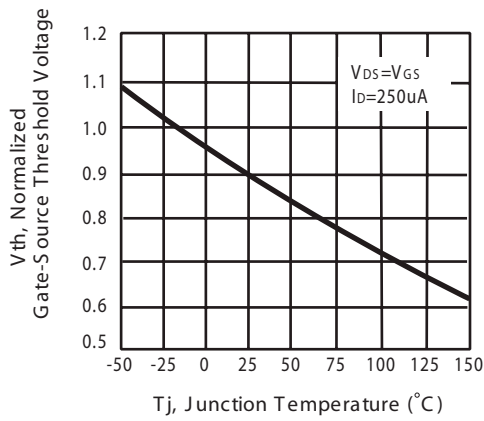


Figure 5. Gate Threshold Variation with Temperature

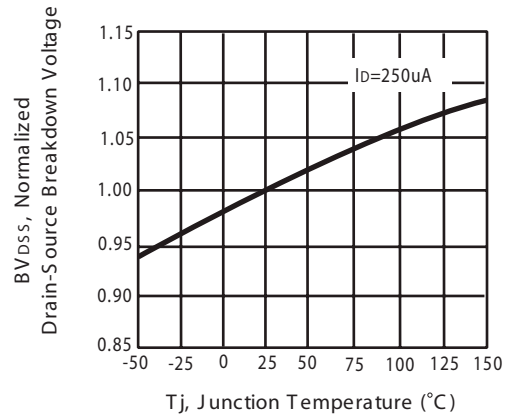


Figure 6. Breakdown Voltage Variation with Temperature

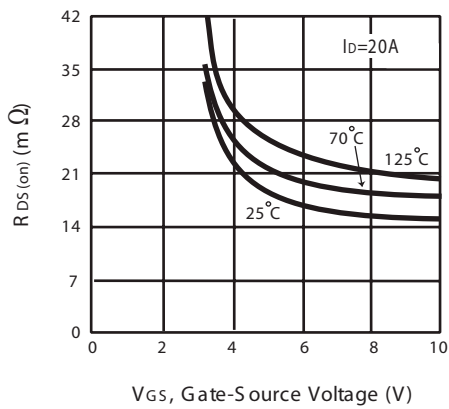


Figure 7. On-Resistance vs. Gate-Source Voltage

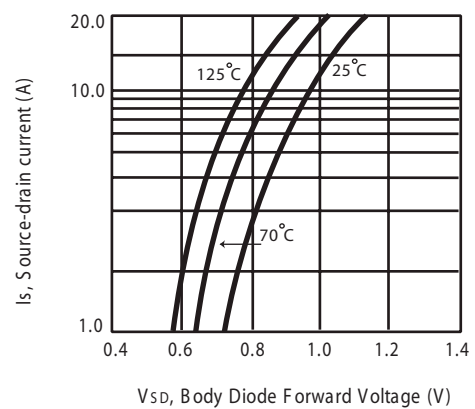
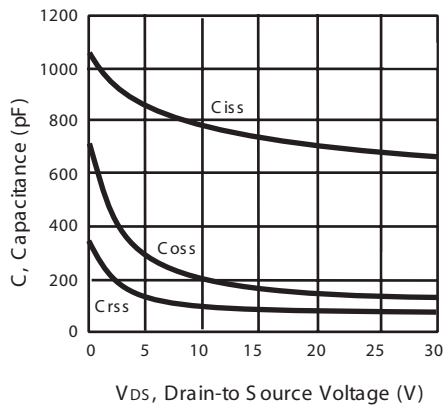


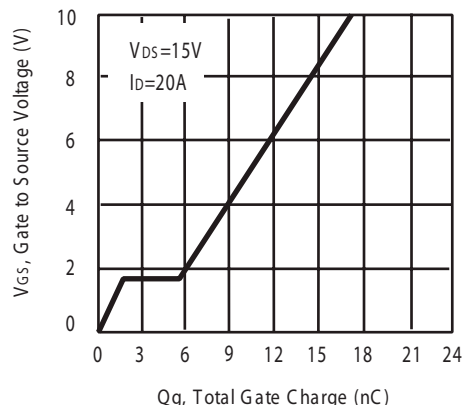
Figure 8. Body Diode Forward Voltage Variation with Source Current

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V<sub>DS</sub>, Drain-to Source Voltage (V)

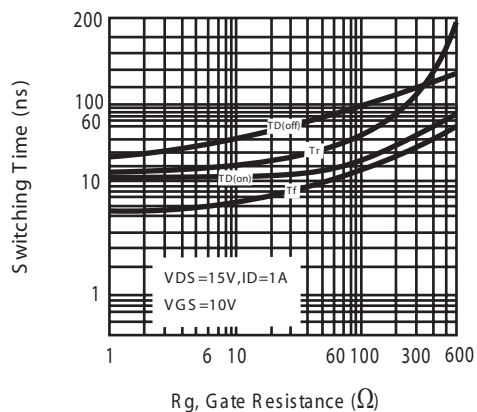
Figure 9. Capacitance



V<sub>GS</sub>, Gate to Source Voltage (V)

Q<sub>g</sub>, Total Gate Charge (nC)

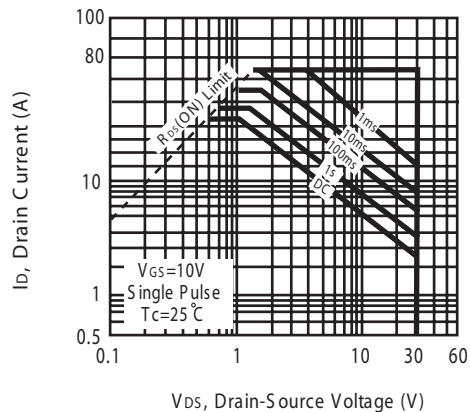
Figure 10. Gate Charge



Switching Time (ns)

R<sub>g</sub>, Gate Resistance (Ω)

Figure 11. switching characteristics



I<sub>D</sub>, Drain Current (A)

V<sub>DS</sub>, Drain-Source Voltage (V)

Figure 12. Maximum Safe Operating Area

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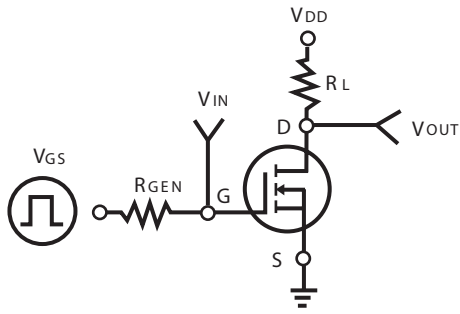


Figure 11. S switching Test Circuit

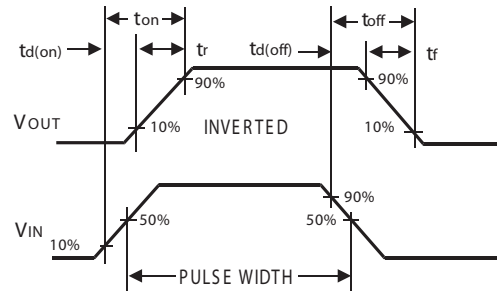


Figure 12. S switching Waveforms

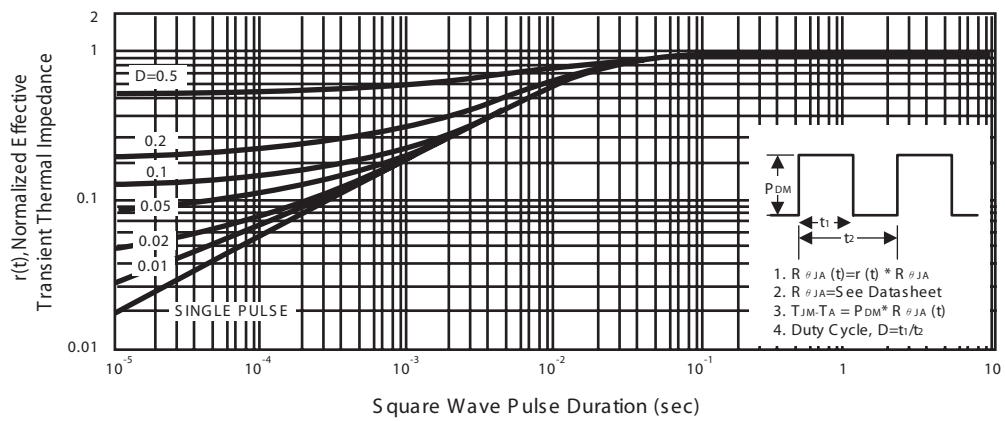
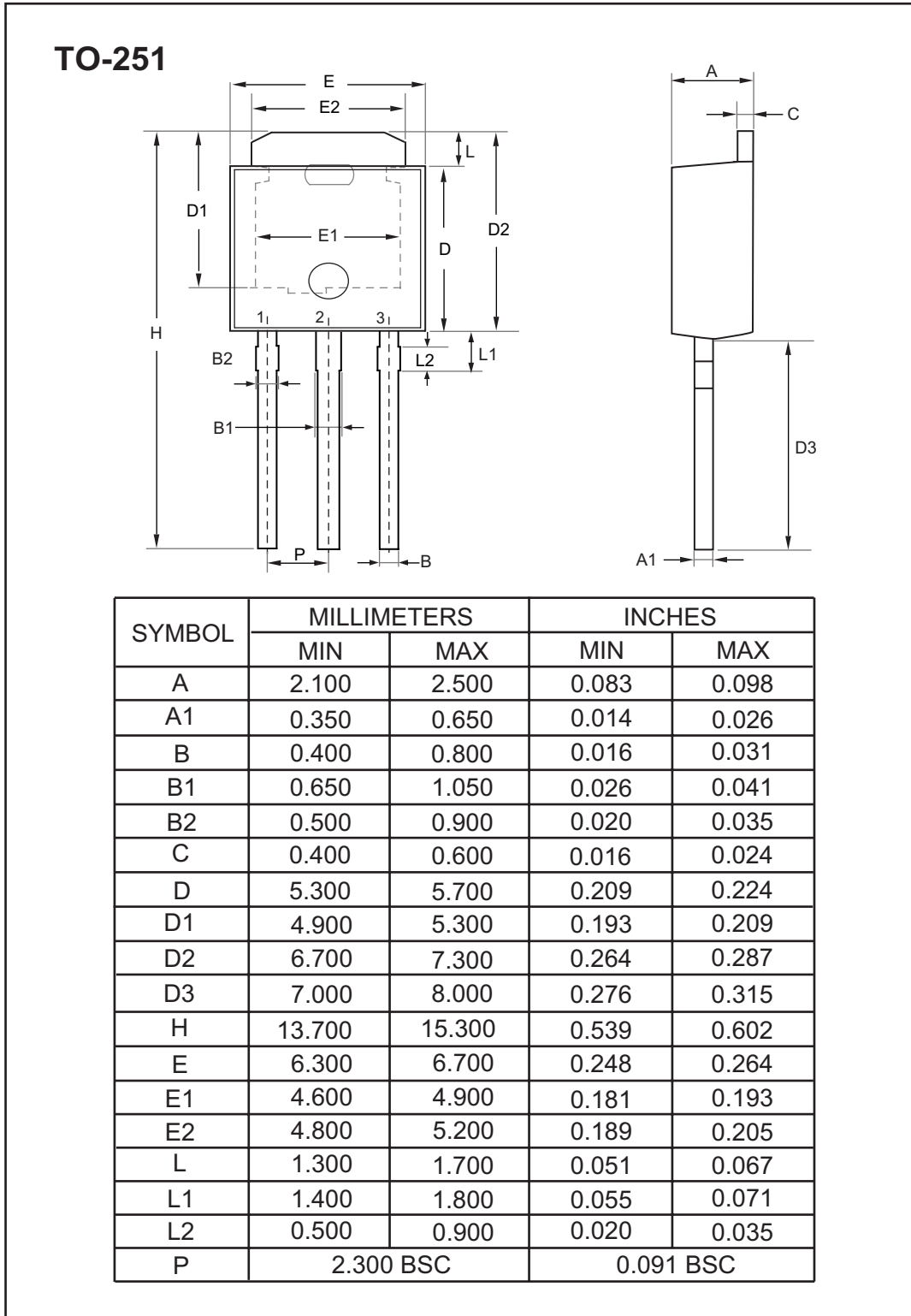


Figure 13. Normalized Thermal Transient Impedance Curve

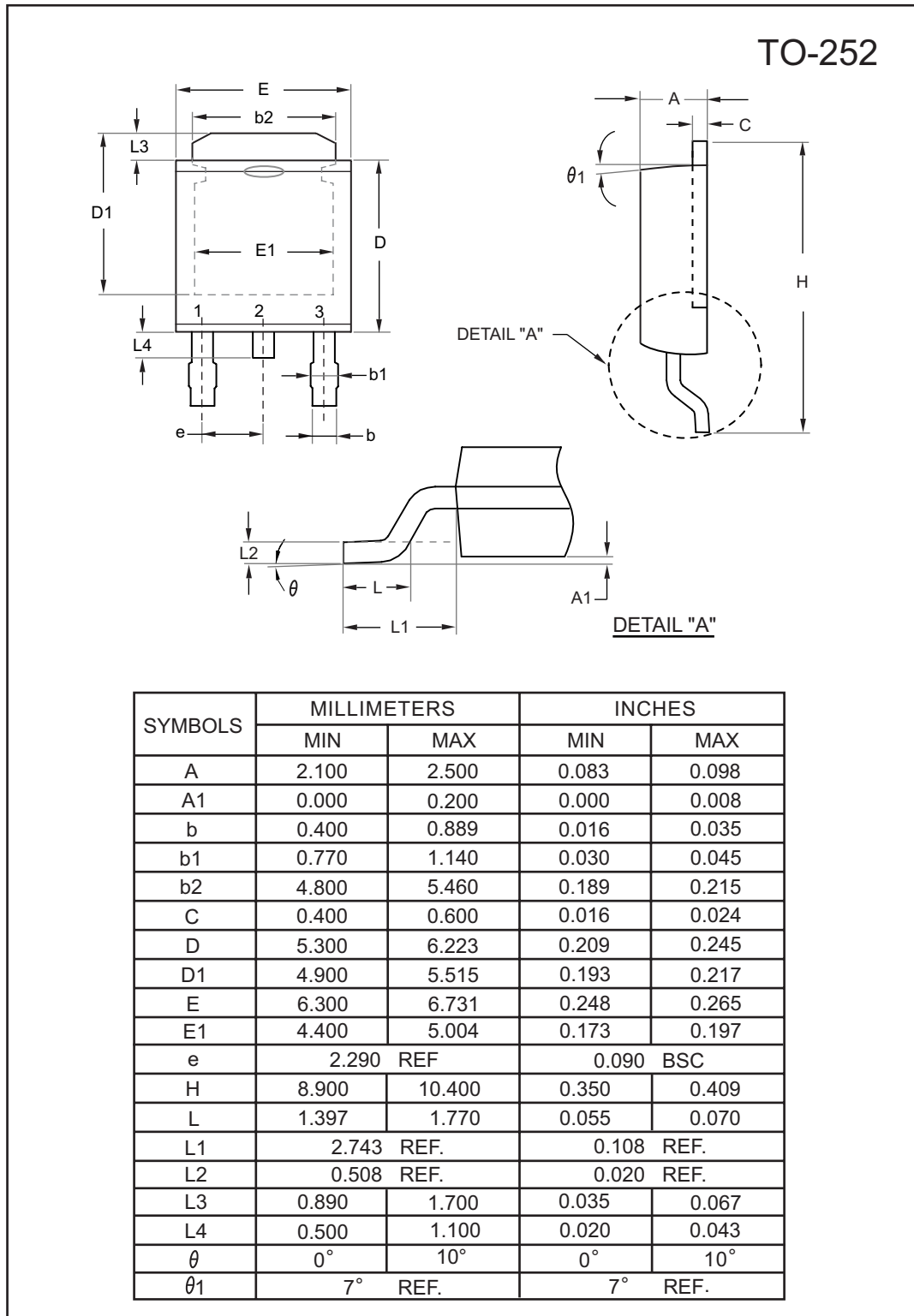
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## PACKAGE OUTLINE DIMENSIONS



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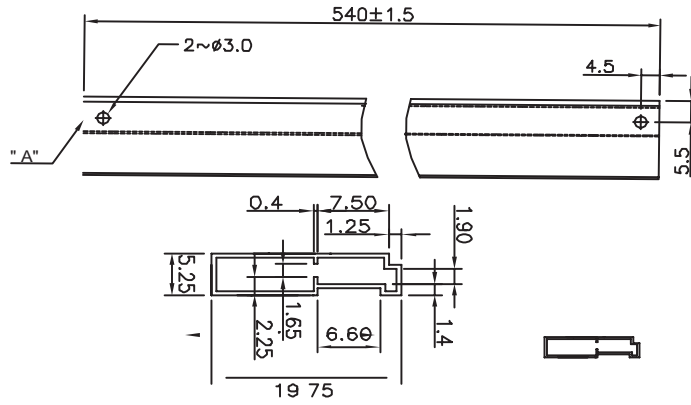
## PACKAGE OUTLINE DIMENSIONS



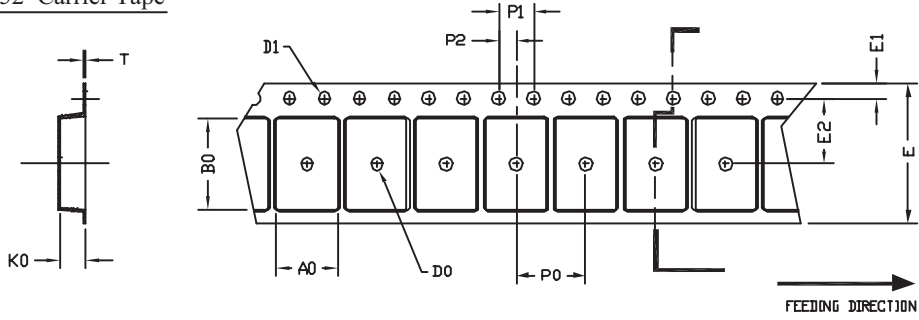
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## TO251 Tube/TO-252 Tape and Reel Data

### TO-251 Tube



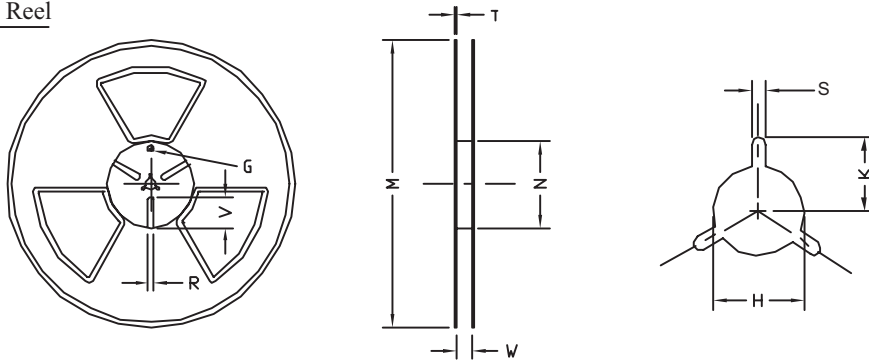
### TO-252 Carrier Tape



UNIT:mm

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
TO-252 (16 mm)	6.80 ±0.1	10.3 ±0.1	2.50 ±0.1	φ2	φ1.5 +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	---	---	---