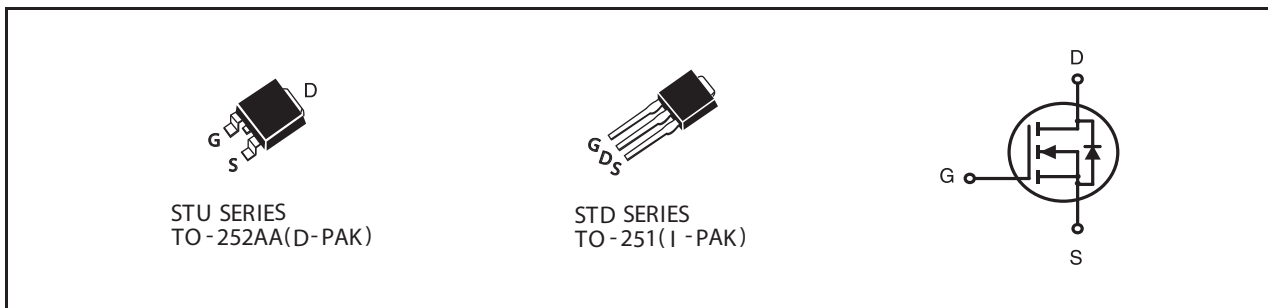


**N-Channel Logic Level Enhancement Mode Field Effect Transistor****PRODUCT SUMMARY**

VDSS	ID	RDS(ON) (mΩ) Max
40V	38A	16.5 @ VGS=10V
		23 @ VGS=4.5V

FEATURES

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

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

Symbol	Parameter	Limit	Units
V _{DS}	Drain-Source Voltage	40	V
V _{GS}	Gate-Source Voltage	±20	V
I _D	Drain Current-Continuous ^a	T _C =25°C	38
		T _C =70°C	30
I _{DM}	-Pulsed ^b	111	A
E _{AS}	Single Pulse Avalanche Energy ^d	64	mJ
P _D	Maximum Power Dissipation ^a	T _C =25°C	42
		T _C =70°C	27
T _J , T _{STG}	Operating Junction and Storage Temperature Range	-55 to 150	°C

THERMAL CHARACTERISTICS

R _{θJC}	Thermal Resistance, Junction-to-Case ^a	3	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient ^a	50	°C/W

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ELECTRICAL CHARACTERISTICS (T_A=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	40			V	
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =32V , 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	1.7	1.9	3	V	
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =10V , I _D =19A		13	16.5	m ohm	
		V _{GS} =4.5V , I _D =16A		17	23	m ohm	
g _{FS}	Forward Transconductance	V _{DS} =5V , I _D =19A		43		S	
DYNAMIC CHARACTERISTICS [°]							
C _{ISS}	Input Capacitance	V _{DS} =20V, V _{GS} =0V f=1.0MHz		755		pF	
C _{OSS}	Output Capacitance				121		pF
C _{RSS}	Reverse Transfer Capacitance				102		pF
SWITCHING CHARACTERISTICS [°]							
t _{D(ON)}	Turn-On Delay Time	V _{DD} =20V I _D =1A V _{GS} =10V R _{GEN} = 6 ohm		16		ns	
t _r	Rise Time			29		ns	
t _{D(OFF)}	Turn-Off Delay Time			42		ns	
t _f	Fall Time			10		ns	
Q _g	Total Gate Charge	V _{DS} =20V, I _D =19A, V _{GS} =10V		16.5		nC	
		V _{DS} =20V, I _D =19A, V _{GS} =4.5V		8.7		nC	
Q _{gs}	Gate-Source Charge	V _{DS} =20V, I _D =19A, V _{GS} =10V		2.1		nC	
Q _{gd}	Gate-Drain Charge			5		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 =4A		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} = 20V. (See Figure13)

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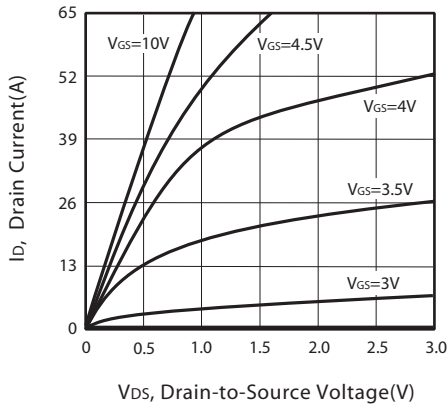


Figure 1. Output Characteristics

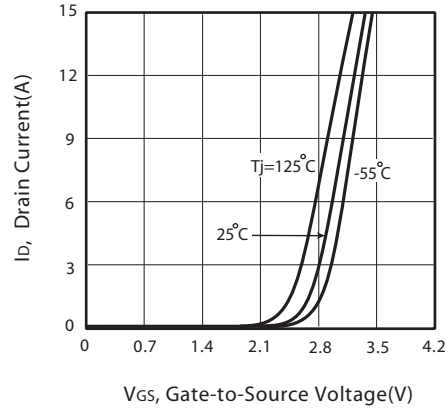


Figure 2. Transfer Characteristics

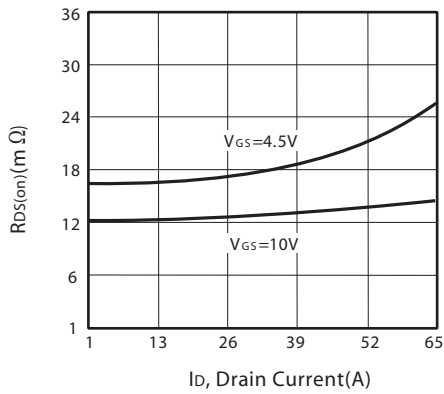


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

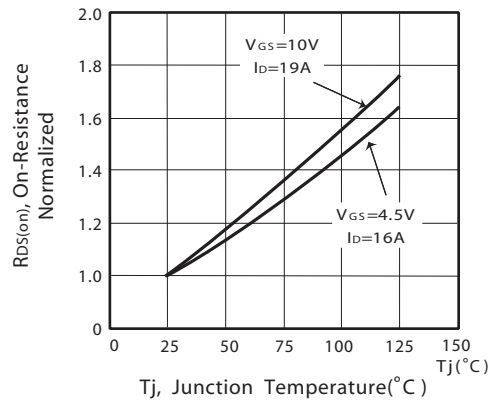


Figure 4. On-Resistance Variation with Drain Current and Temperature

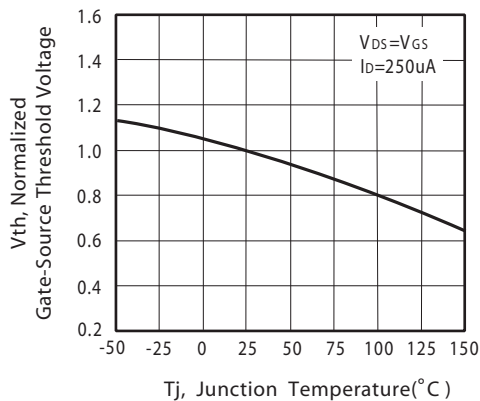


Figure 5. Gate Threshold Variation with Temperature

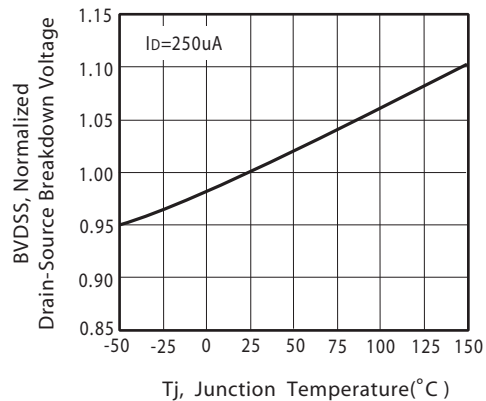


Figure 6. Breakdown Voltage Variation with Temperature

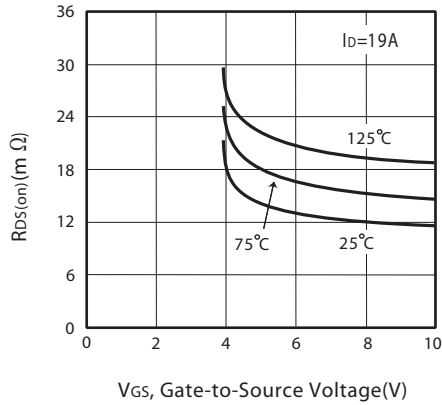


Figure 7. On-Resistance vs. Gate-Source Voltage

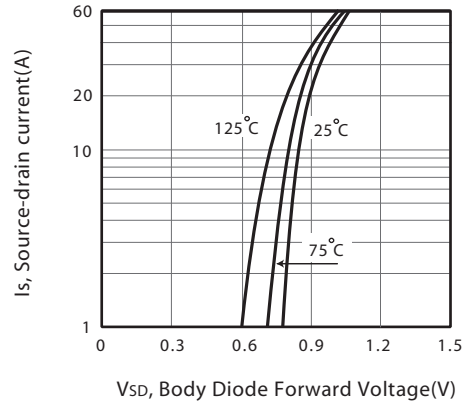


Figure 8. Body Diode Forward Voltage Variation with Source Current

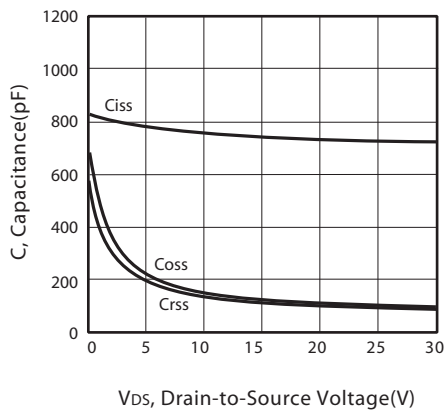


Figure 9. Capacitance

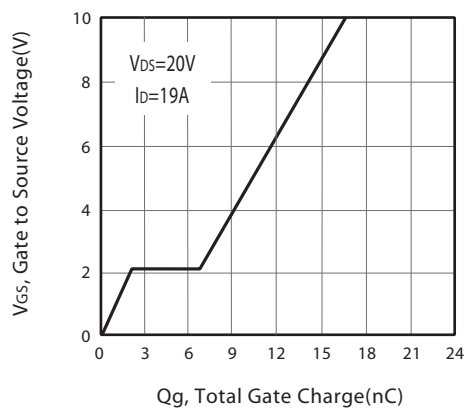


Figure 10. Gate Charge

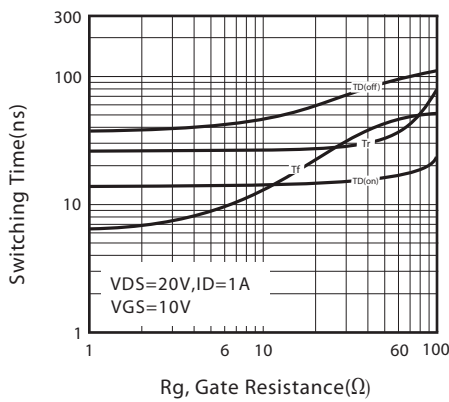


Figure 11. switching characteristics

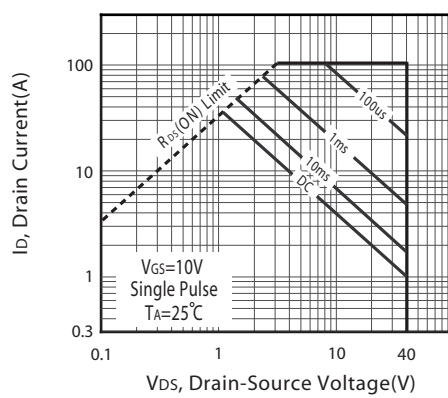
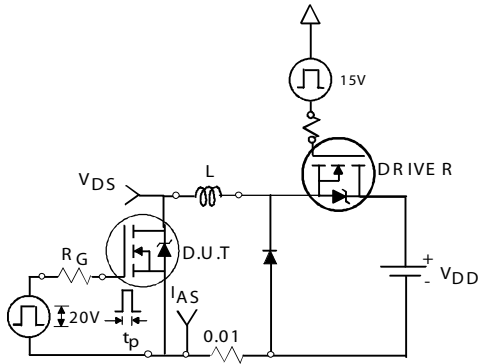
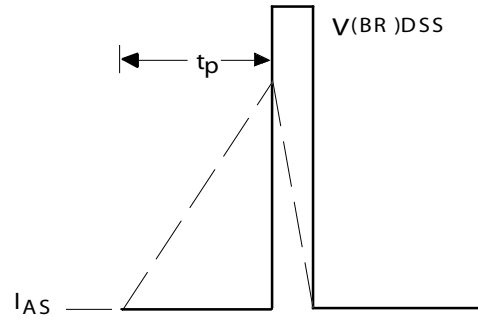


Figure 12. Maximum Safe Operating Area



Unclamped Inductive Test Circuit

Figure 13a.



Unclamped Inductive Waveforms

Figure 13b.

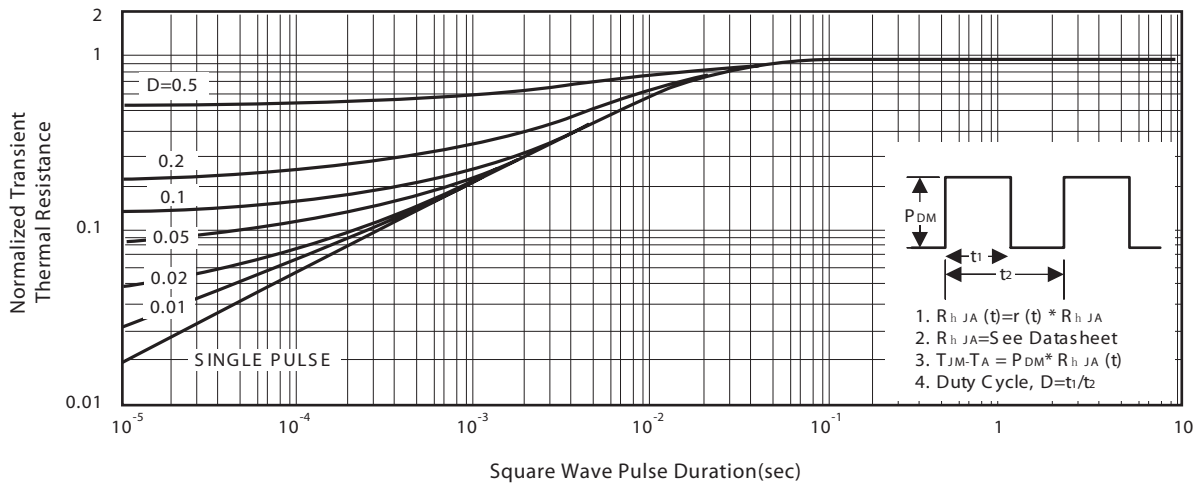
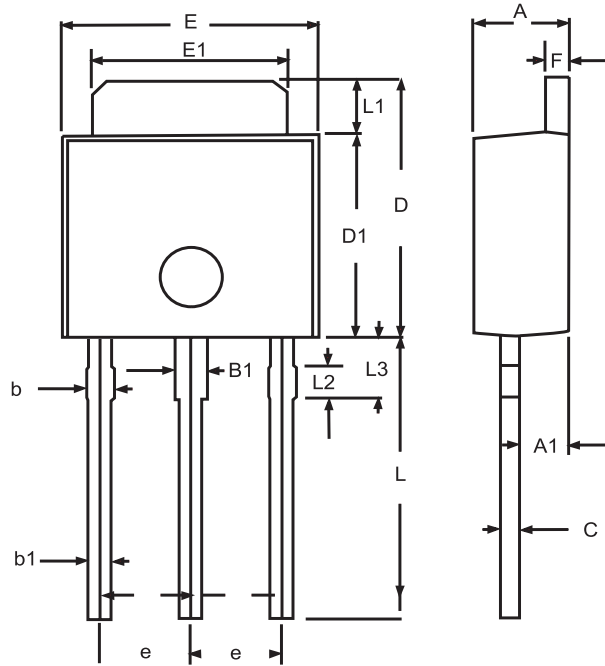


Figure 14. Normalized Thermal Transient Impedance Curve

PACKAGE OUTLINE DIMENSIONS

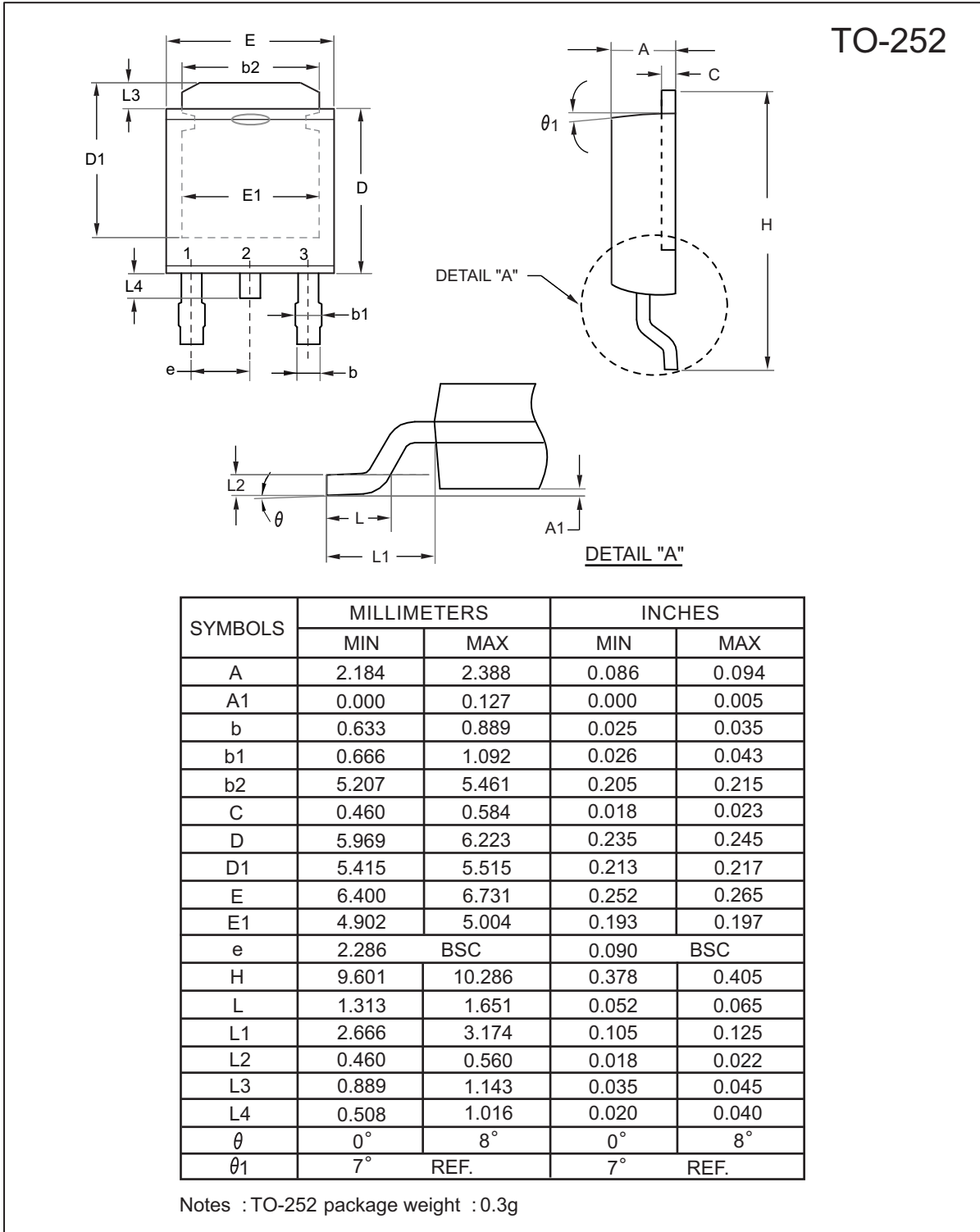
TO-251



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.20	2.40	0.087	0.095
A1	1.100	1.300	0.043	0.051
B1	0.650	1.050	0.026	0.041
b	0.500	0.900	0.020	0.035
b1	0.400	0.800	0.016	0.32
C	0.400	0.600	0.016	0.024
D	6.700	7.300	0.264	0.287
D1	5.400	5.650	0.213	0.222
E	6.40	6.650	0.252	0.262
e	2.100	2.500	0.083	0.098
F	0.400	0.600	0.016	0.024
L	7.000	8.000	0.276	0.315
L1	1.300	1.700	0.051	0.067
L2	0.700	0.900	0.028	0.035
L3	1.400	1.800	0.055	0.071

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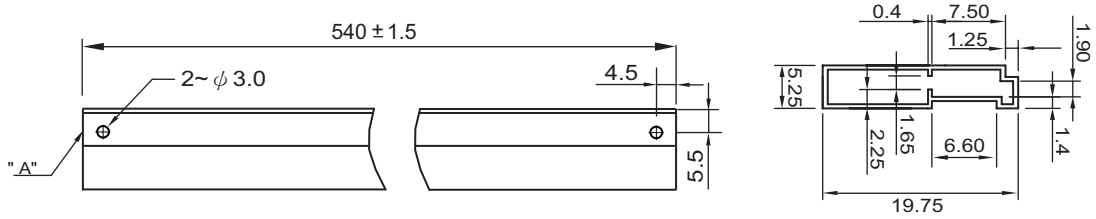
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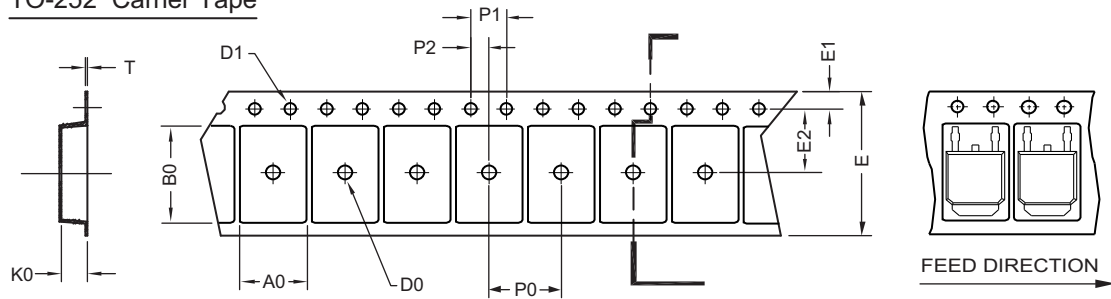
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TO-251 Tube/TO-252 Tape and Reel Data

TO-251 Tube



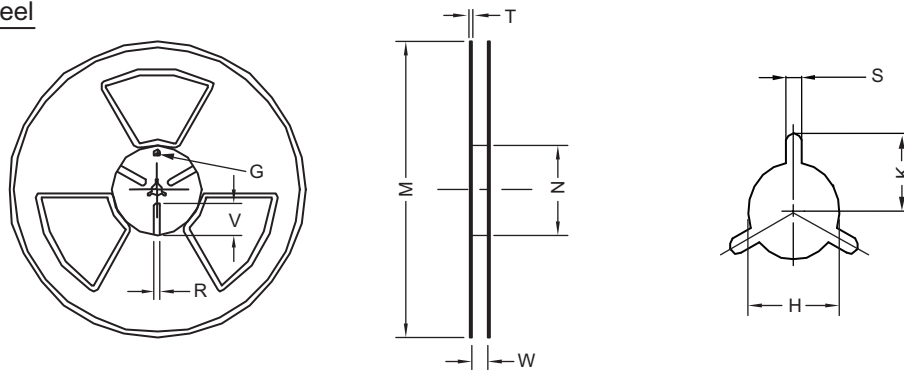
TO-252 Carrier Tape



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	---	---	---