



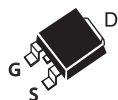
N-Channel Logic Level Enhancement Mode Field Effect Transistor

PRODUCT SUMMARY

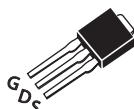
V _{DSS}	I _D	R _{DS(ON)} (mΩ) Max
30V	60A	4.7 @ V _{GS} =10V
		6.8 @ V _{GS} =4.5V

FEATURES

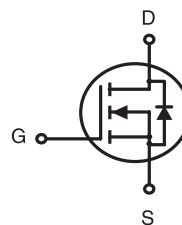
- Super high dense cell design for low R_{DS(ON)}.
- Rugged and reliable.
- TO-252 and TO-251 Package.



STU SERIES
TO-252AA(D-PAK)



STD SERIES
TO-251(I-PAK)



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

Symbol	Parameter	Limit	Units
V _{DS}	Drain-Source Voltage	30	V
V _{GS}	Gate-Source Voltage	±20	V
I _D	Drain Current-Continuous	T _C =25°C	60
		T _C =70°C	48
I _{DM}	-Pulsed ^a	176	A
E _{AS}	Single Pulse Avalanche Energy ^c	64	mJ
P _D	Maximum Power Dissipation	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	3	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	50	°C/W

ELECTRICAL CHARACTERISTICS (T_C=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	30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =24V , 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	1.0	1.6	3	V
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =10V , I _D =30A		3.8	4.7	m ohm
		V _{GS} =4.5V , I _D =25A		5.1	6.8	m ohm
g _{FS}	Forward Transconductance	V _{DS} =10V , I _D =30A		64		S
DYNAMIC CHARACTERISTICS ^b						
C _{ISS}	Input Capacitance	V _{DS} =15V,V _{GS} =0V f=1.0MHz		2060		pF
C _{OSS}	Output Capacitance			323		pF
C _{RSS}	Reverse Transfer Capacitance			255		pF
SWITCHING CHARACTERISTICS ^b						
t _{D(ON)}	Turn-On Delay Time	V _{DD} =15V I _D =1A V _{GS} =10V R _{GEN} = 6 ohm		31		ns
t _r	Rise Time			32		ns
t _{D(OFF)}	Turn-Off Delay Time			106		ns
t _f	Fall Time			17		ns
Q _g	Total Gate Charge	V _{DS} =15V,I _D =30A,V _{GS} =10V		29		nC
		V _{DS} =15V,I _D =30A,V _{GS} =4.5V		13.5		nC
Q _{gs}	Gate-Source Charge	V _{DS} =15V,I _D =30A, V _{GS} =10V		2.7		nC
Q _{gd}	Gate-Drain Charge			9		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
V _{SD}	Diode Forward Voltage	V _{GS} =0V,I _S =6A		0.78	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_J=25°C, L=0.5mH, V_{DD} = 20V. (See Figure13)

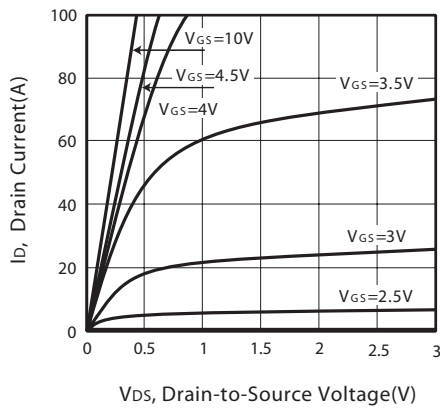


Figure 1. Output Characteristics

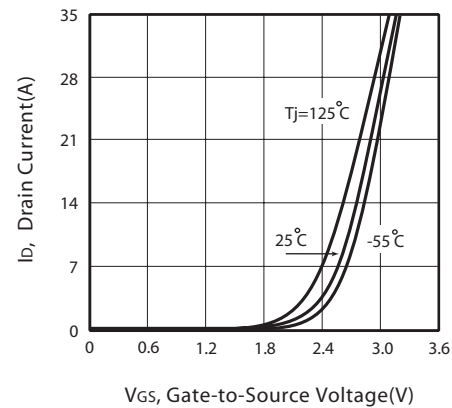


Figure 2. Transfer Characteristics

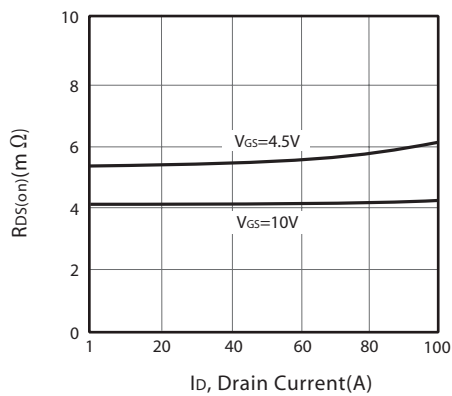


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

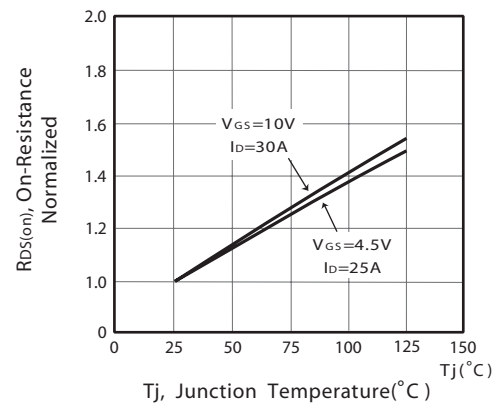


Figure 4. On-Resistance Variation with Drain Current and Temperature

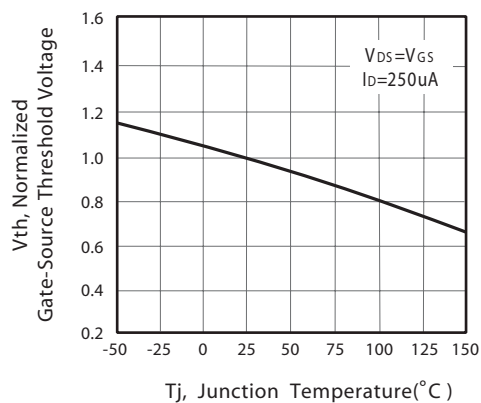


Figure 5. Gate Threshold Variation with Temperature

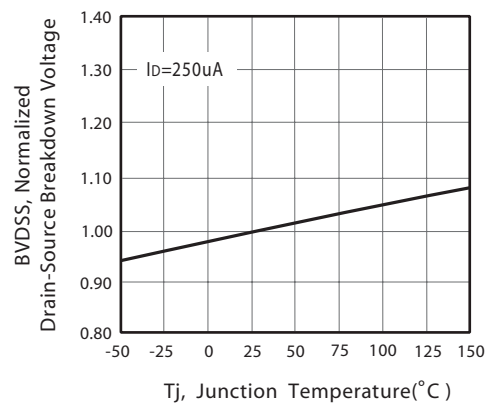


Figure 6. Breakdown Voltage Variation with Temperature

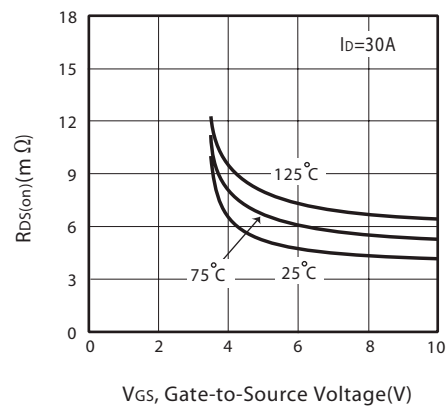


Figure 7. On-Resistance vs. Gate-Source Voltage

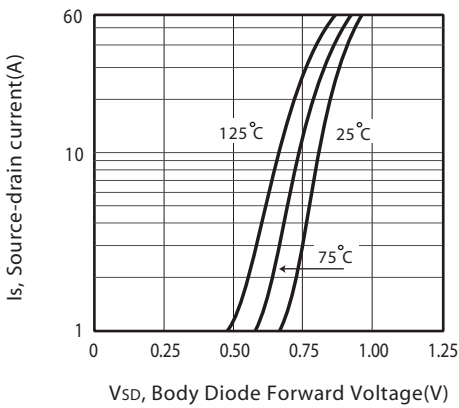


Figure 8. Body Diode Forward Voltage Variation with Source Current

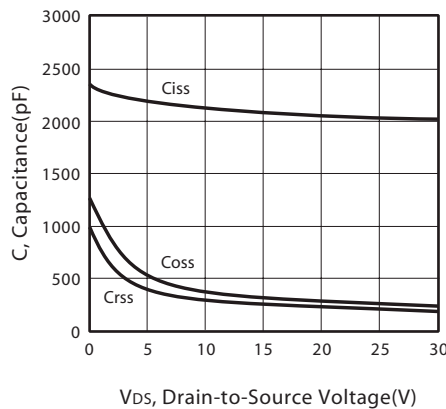


Figure 9. Capacitance

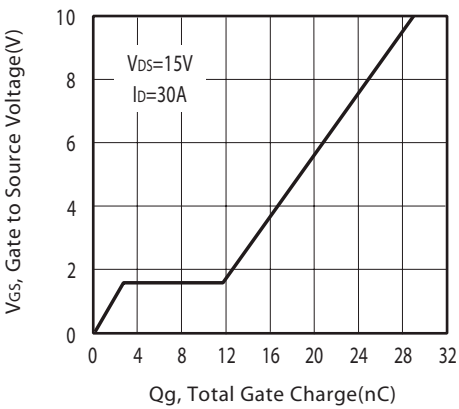


Figure 10. Gate Charge

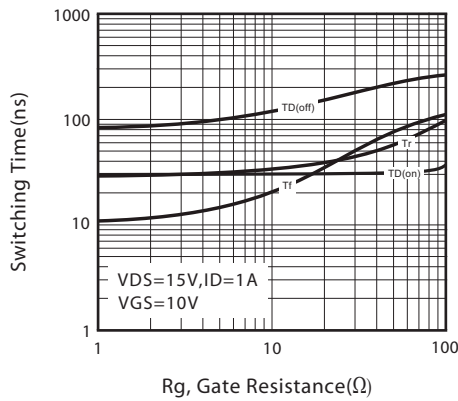


Figure 11. switching characteristics

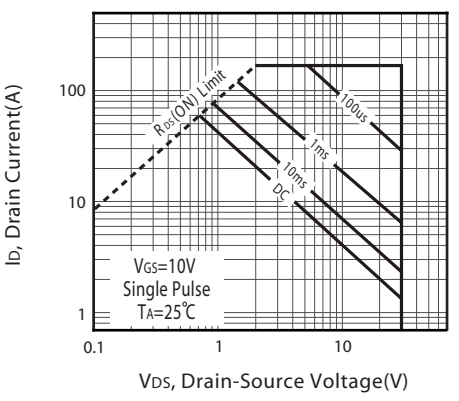
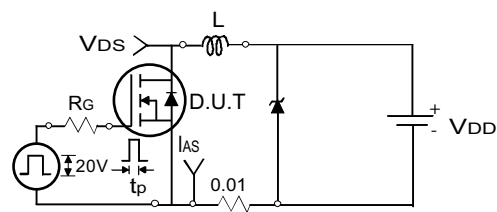
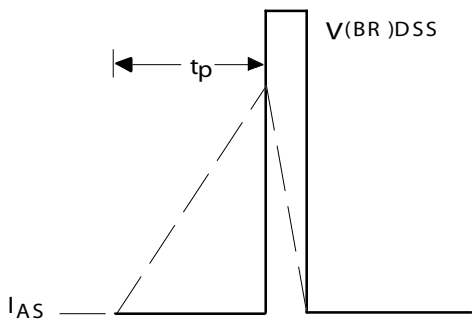


Figure 12. Maximum Safe Operating Area



Uncamped Inductive Test Circuit

Figure 13a.



Unclamped Inductive Waveforms

Figure 13b.

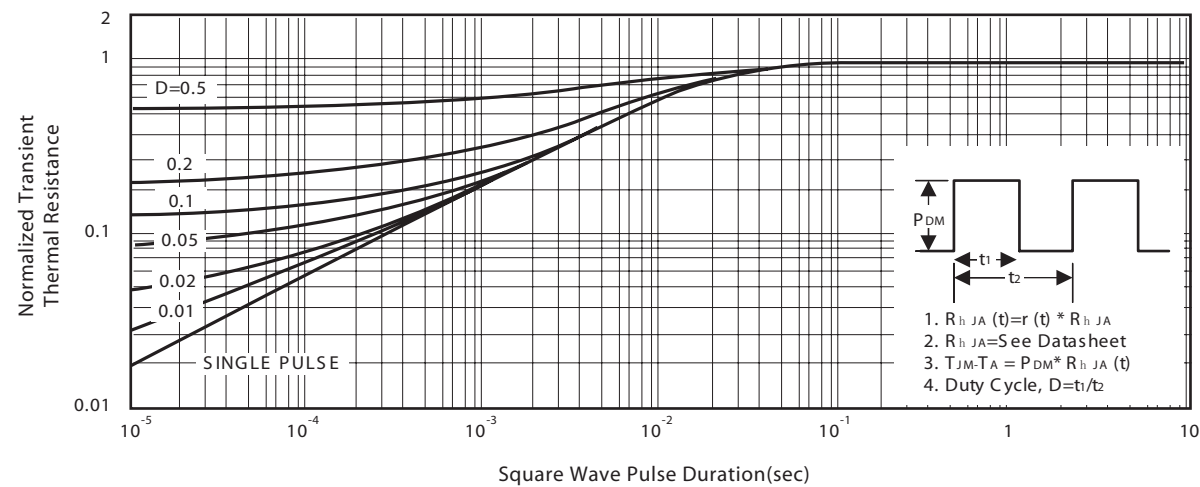
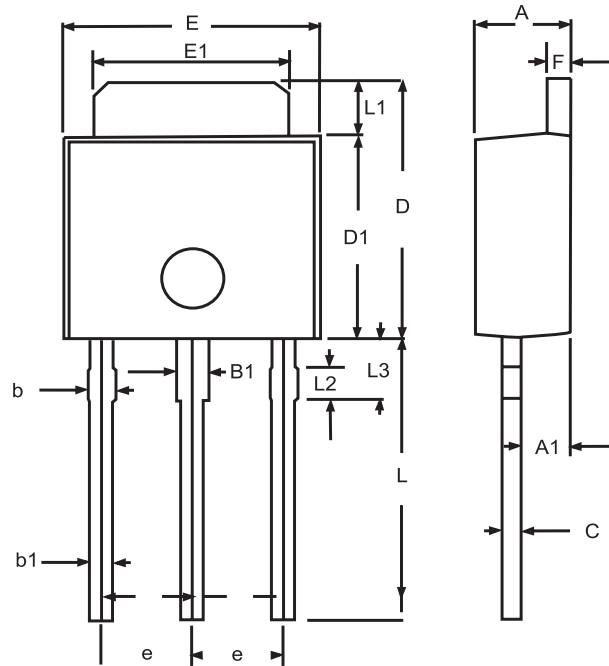


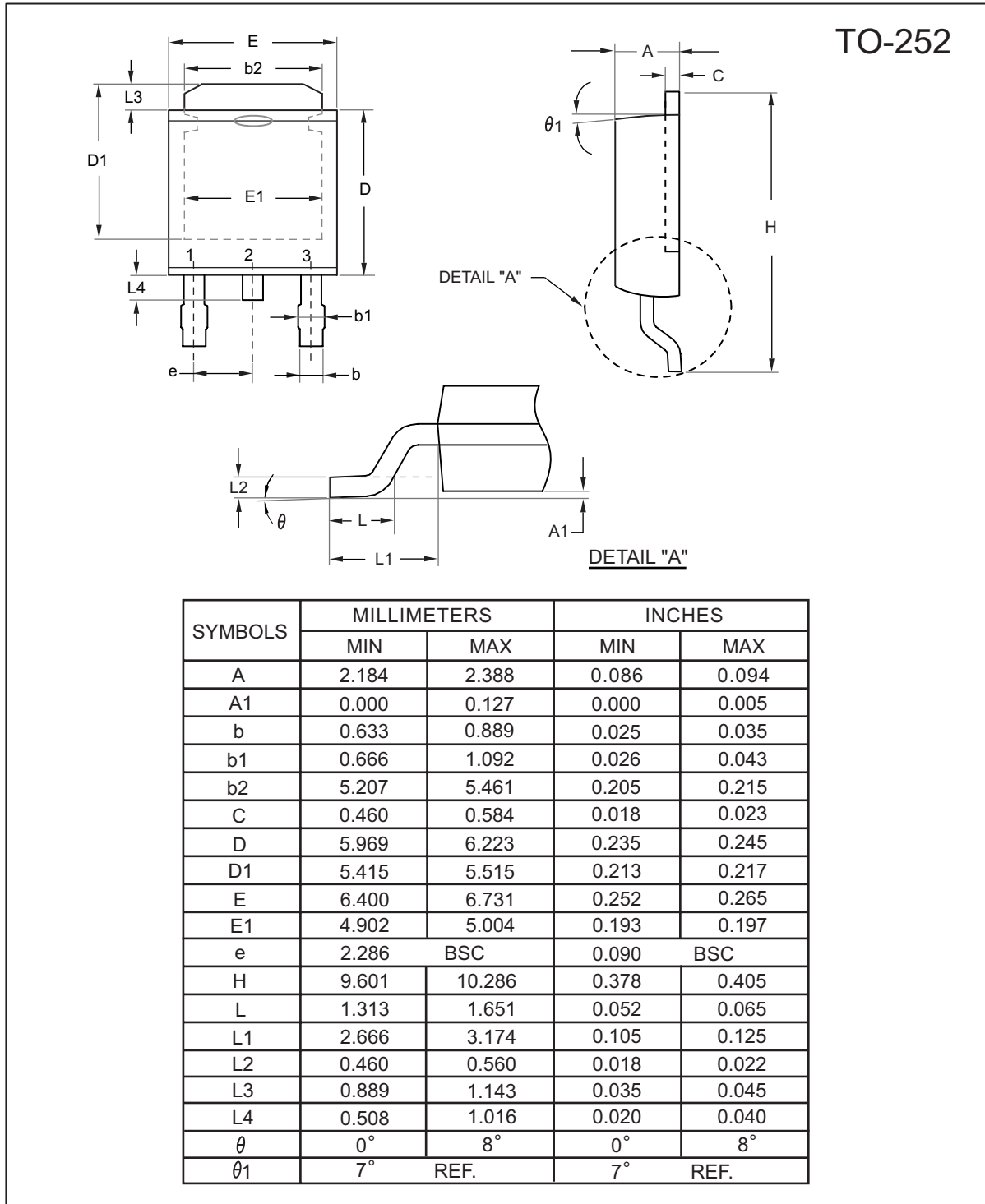
Figure 14. Normalized Thermal Transient Impedance Curve

PACKAGE OUTLINE DIMENSIONS

TO-251

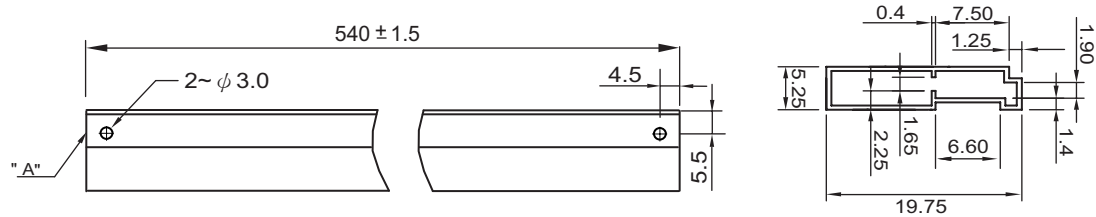


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.20	2.40	0.087	0.095
A1	1.100	1.300	0.043	0.051
B1	0.650	1.050	0.026	0.041
b	0.500	0.900	0.020	0.035
b1	0.400	0.800	0.016	0.32
C	0.400	0.600	0.016	0.024
D	6.700	7.300	0.264	0.287
D1	5.400	5.650	0.213	0.222
E	6.40	6.650	0.252	0.262
e	2.100	2.500	0.083	0.098
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

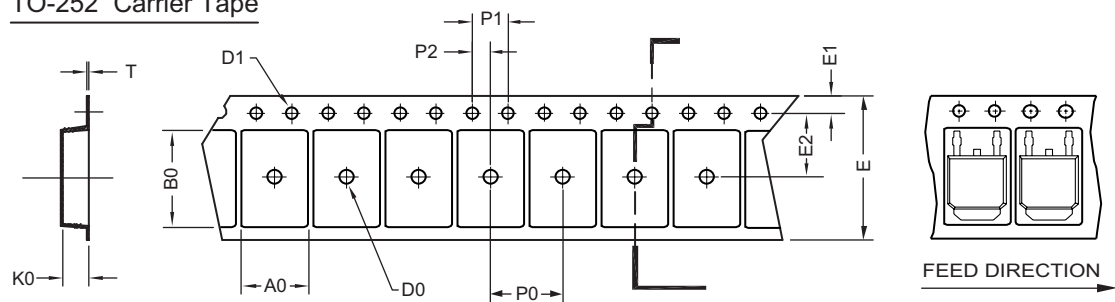


TO-251 Tube/TO-252 Tape and Reel Data

TO-251 Tube



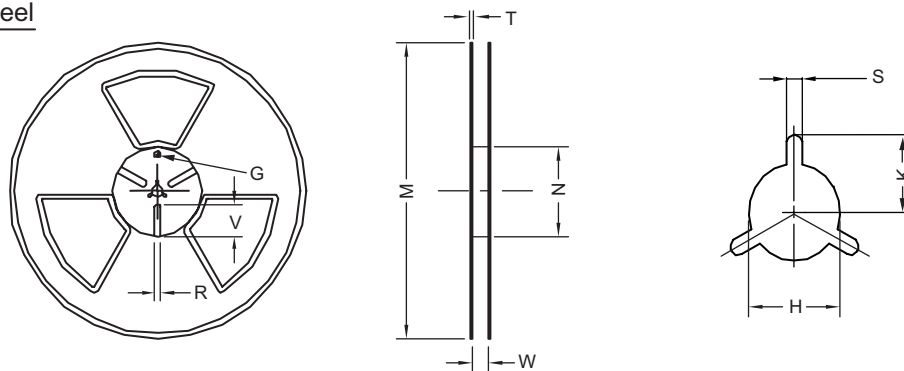
TO-252 Carrier Tape



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	$\phi 2$	$\phi 1.5$ $+0.1$ -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	$\phi 330$	$\phi 330$ ± 0.5	$\phi 97$ ± 1.0	17.0 $+1.5$ -0	2.2	$\phi 13.0$ $+0.5$ -0.2	10.6	2.0 ± 0.5	---	---	---