



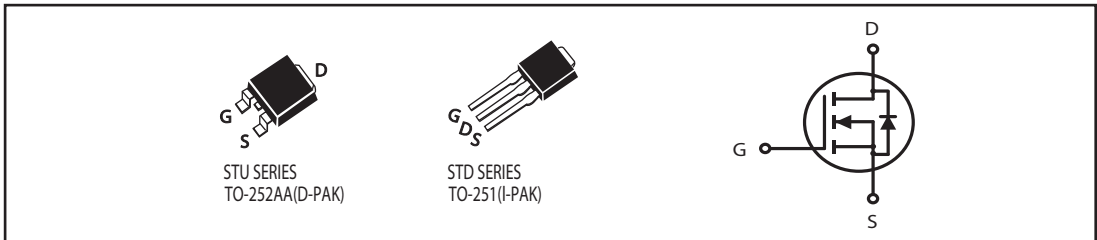
N-Channel Logic Level Enhancement Mode Field Effect Transistor

PRODUCT SUMMARY

V _{DS}	I _D	R _{DS(ON)} (mΩ) Max
40V	50A	9 @ V _{GS} = 10V

FEATURES

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



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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V _{DS}	40	V
Gate-Source Voltage	V _{GS}	±20	V
Drain Current-Continuous ^a @T _a	I _D	50	A
-Pulsed ^b			
Drain-Source Diode Forward Current ^a	I _S	20	A
Avalanche Current ^c	I _{AS}	23	A
Avalanche Energy ^c	E _{AS}	130	mJ
Maximum Power Dissipation ^a	P _D	50	W
T _a = 25°C			
Operating Junction and Storage Temperature Range	T _J , T _{STG}	-55 to 175	°C

THERMAL CHARACTERISTICS

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

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0V, I _D = 250uA	40			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 32V, V _{GS} = 0V			1	uA
Gate-Body Leakage	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V			±100	nA
ON CHARACTERISTICS ^a						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250uA	1.25	1.6	3	V
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} = 1.0V, I _D = 10A		7	9	m ohm
		V _{GS} = 4.5V, I _D = 5A		9	11	m ohm
On-State Drain Current	I _{D(on)}	V _{DS} = 10V, V _{GS} = 10V	30			A
Forward Transconductance	g _{FS}	V _{DS} = 10V, I _D = 10A		28		S
DYNAMIC CHARACTERISTICS ^b						
Input Capacitance	C _{ISS}	V _{DS} = 15V, V _{GS} = 0V f = 1.0MHz		1130		pF
Output Capacitance	C _{OSS}			240		pF
Reverse Transfer Capacitance	C _{RSS}			145		pF
SWITCHING CHARACTERISTICS ^b						
Turn-On Delay Time	t _{D(ON)}	V _{DD} = 15V I _D = 10 A V _{GS} = 10V R _{GEN} = 3.3 ohm		18		ns
Rise Time	t _r			22		ns
Turn-Off Delay Time	t _{D(OFF)}			61		ns
Fall Time	t _f			9.6		ns
Total Gate Charge	Q _g	V _{DS} = 15V, I _D = 10A, V _{GS} = 10V		23.5		nC
		V _{DS} = 15V, I _D = 10A, V _{GS} = 4.5V		11.5		nC
Gate-Source Charge	Q _{gs}	V _{DS} = 15V, I _D = 10A V _{GS} = 10V		2.7		nC
Gate-Drain Charge	Q _{gd}			3.2		nC

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
DRAIN-SOURCE DIODE CHARACTERISTICS ^a						
Diode Forward Voltage	V_{SD}	$V_{GS} = 0V, I_S = 20A$		0.91	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.

c. Starting $T_J=25^\circ\text{C}$, $L=0.5\text{ mH}$, $R_G=25\Omega$, $I_{AS}=23A$, $V_{DD}\leq V_{(BR)DSS}$ (See Figure13)

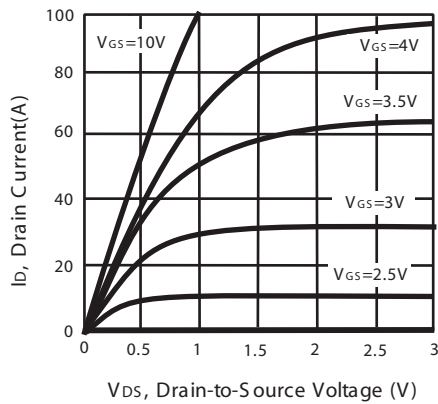


Figure 1. Output Characteristics

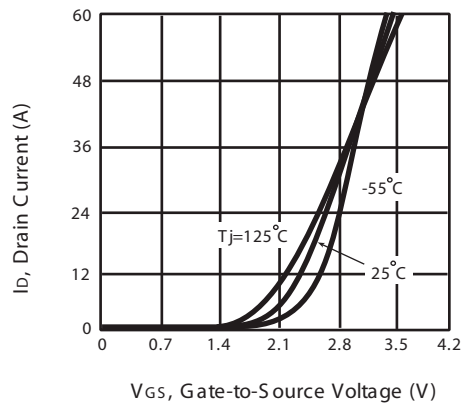


Figure 2. Transfer Characteristics

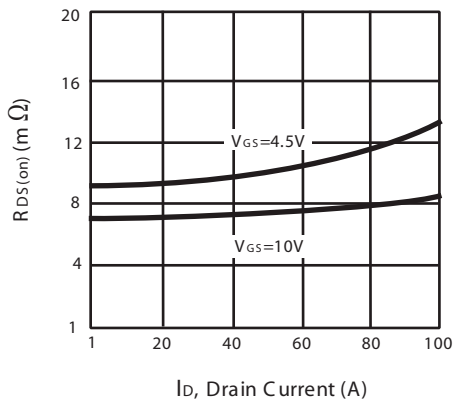


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

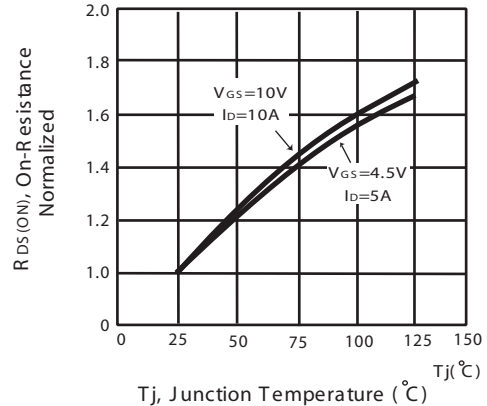


Figure 4. On-Resistance Variation with Drain Current and Temperature

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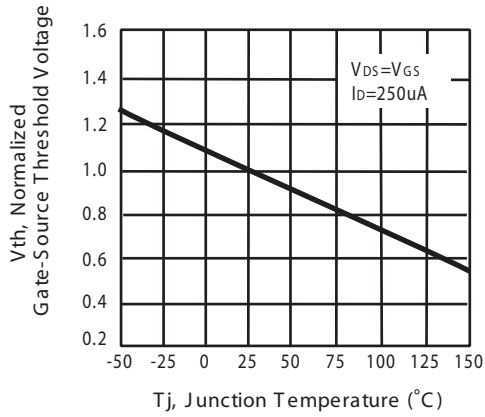


Figure 5. Gate Threshold Variation with Temperature

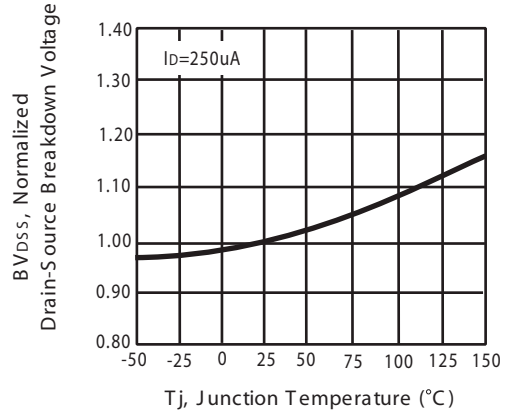


Figure 6. Breakdown Voltage Variation with Temperature

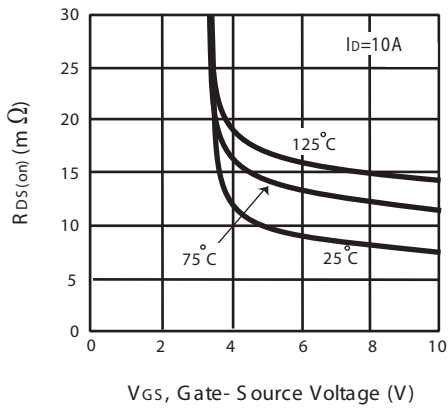


Figure 7. On-Resistance vs. Gate-Source Voltage

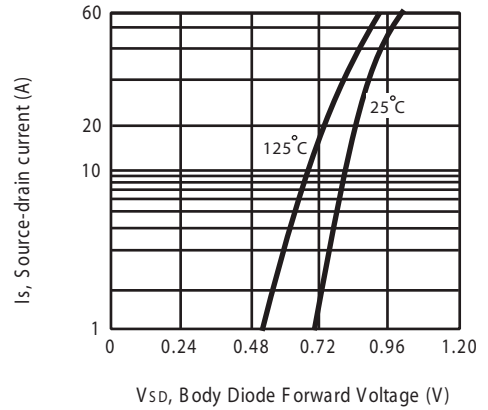


Figure 8. Body Diode Forward Voltage Variation with Source Current

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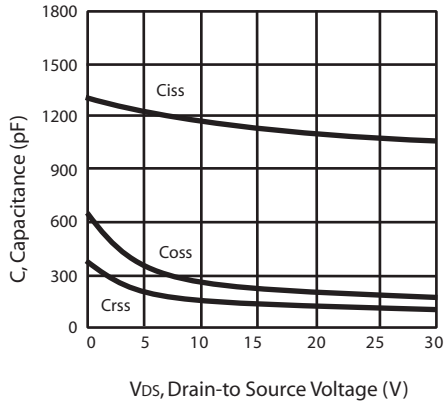


Figure 9. Capacitance

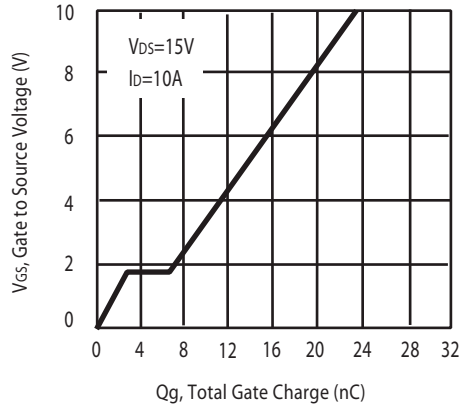


Figure 10. Gate Charge

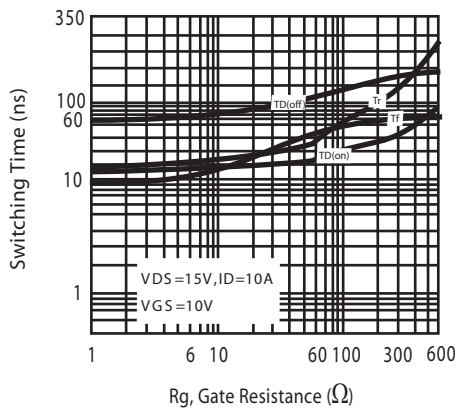


Figure 11. switching characteristics

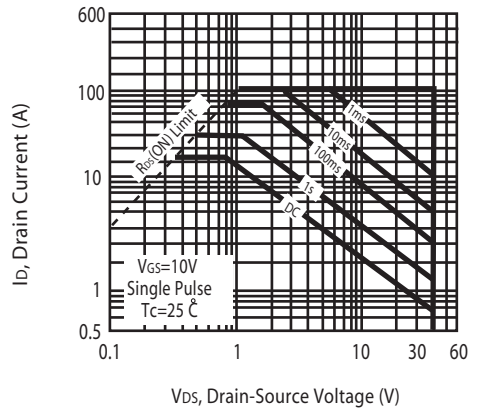
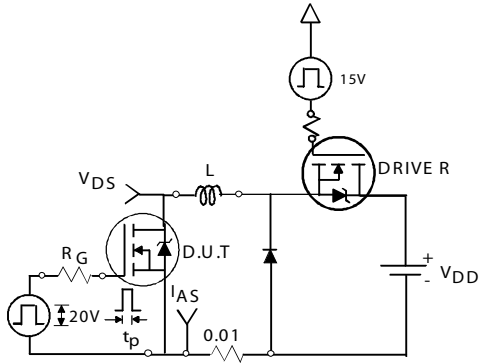


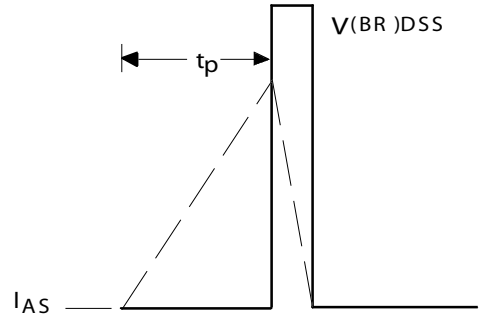
Figure 12. Maximum Safe Operating Area

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Unclamped Inductive Test Circuit

Figure 13a.



Unclamped Inductive Waveforms

Figure 13b.

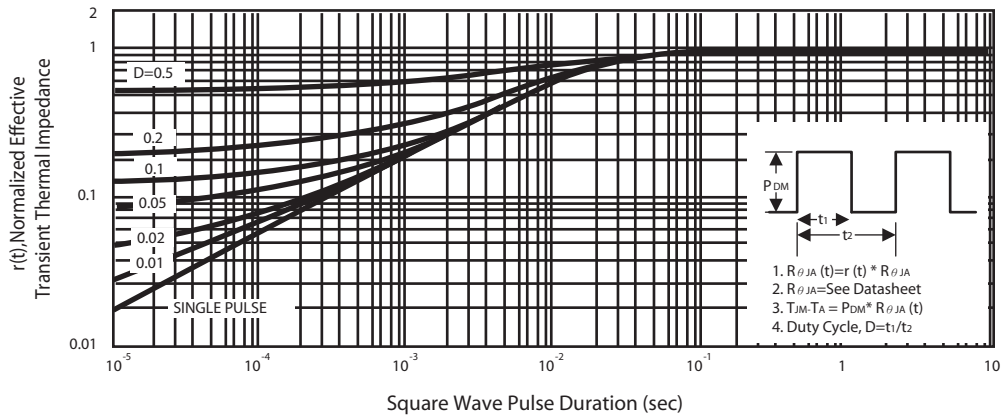
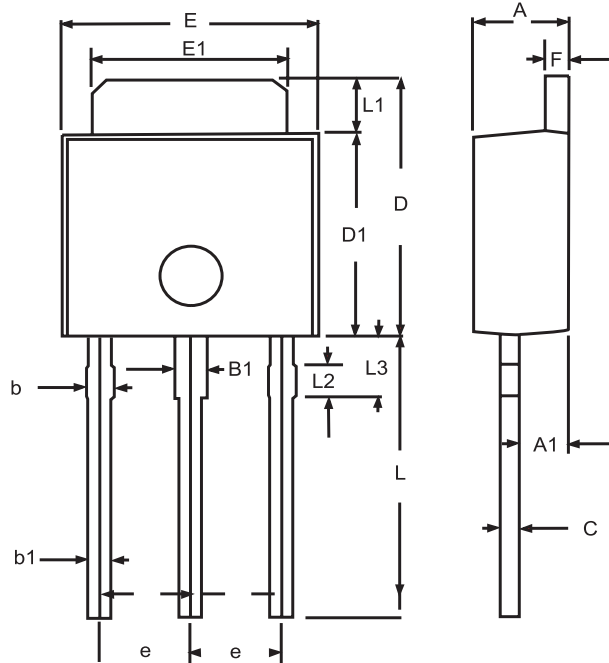


Figure 14. Normalized Thermal Transient Impedance Curve

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PACKAGE OUTLINE DIMENSIONS

TO-251

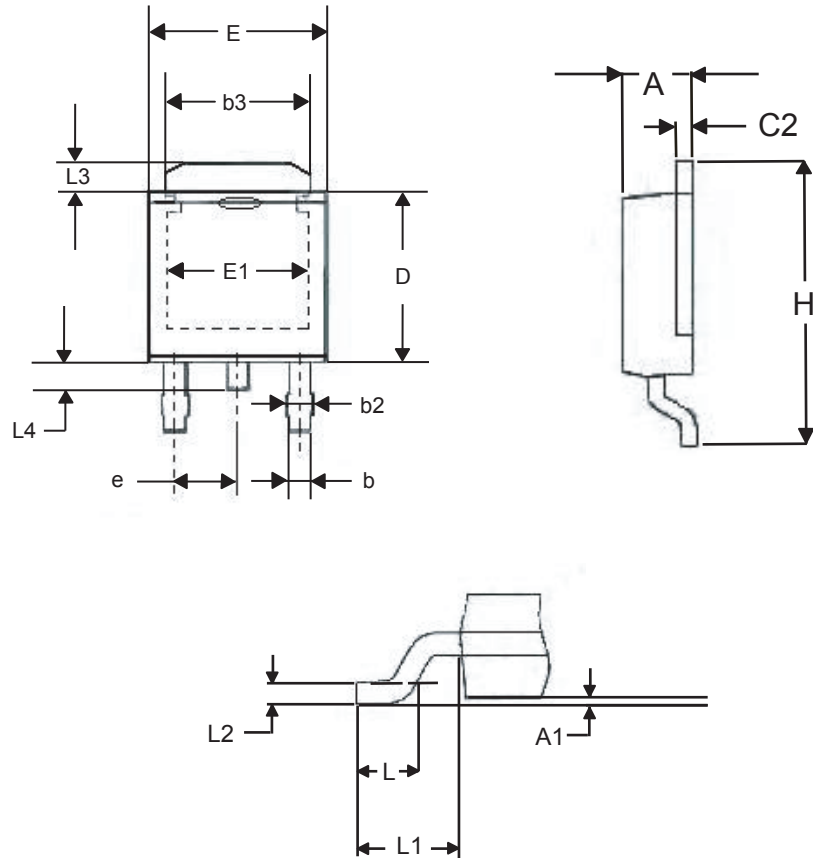


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.20	2.40	0.087	0.095
A1	1.100	1.300	0.043	0.051
B1	0.650	1.050	0.026	0.041
b	0.500	0.900	0.020	0.035
b1	0.400	0.800	0.016	0.32
C	0.400	0.600	0.016	0.024
D	6.700	7.300	0.264	0.287
D1	5.400	5.650	0.213	0.222
E	6.40	6.650	0.252	0.262
e	2.100	2.500	0.083	0.098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

TO-252

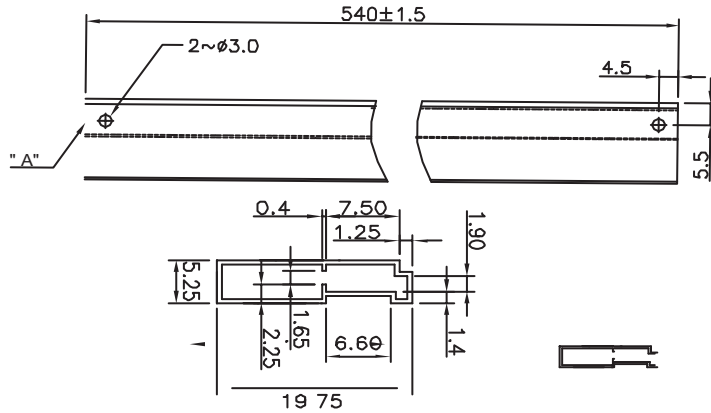


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.210	2.387	0.087	0.094
C ₂	0.483	0.584	0.019	0.023
b	0.814	0.889	0.032	0.035
b ₂	0.864	1.092	0.034	0.043
b ₃	5.232	5.436	0.206	0.214
L ₂	0.508	REF.	0.020	REF.
D	6.000	6.200	0.236	0.244
E	6.400	6.604	0.252	0.260
E ₁	4.902	5.004	0.193	0.197
e	2.290	BSC	0.090	BSC
H	9.601	10.210	0.378	0.402
A ₁	0.010	0.127	0.0004	0.005
L ₄	0.066	0.940	0.026	0.037
L	1.397	1.651	0.055	0.065
L ₁	2.743	REF.	0.108	REF.
L ₃	1.100	REF.	0.043	REF.

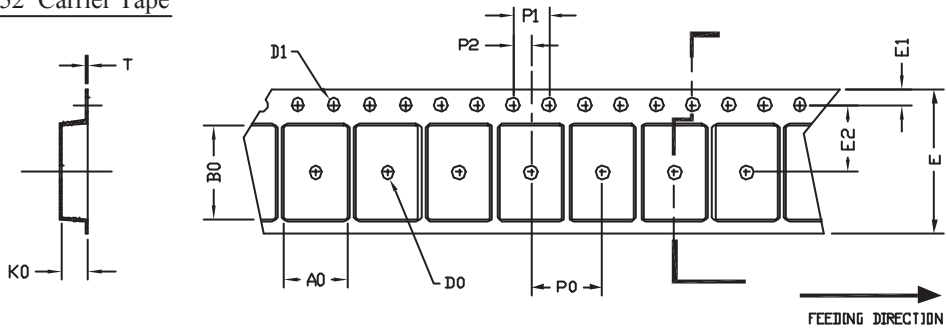
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TO251 Tube/TO-252 Tape and Reel Data

TO-251 Tube



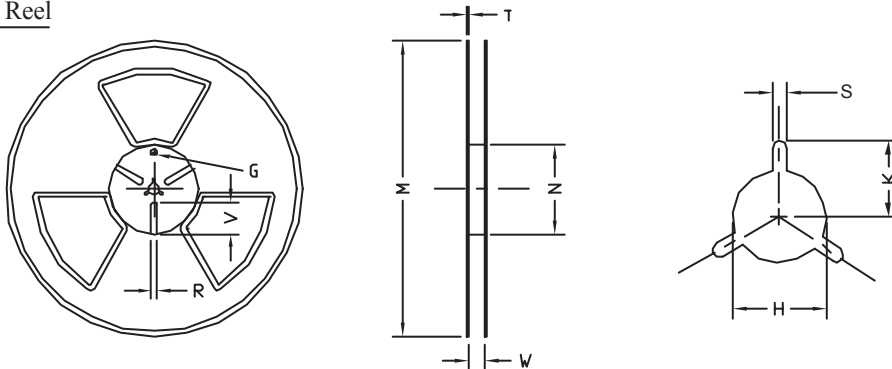
TO-252 Carrier Tape



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	$\phi 2$	$\phi 1.5$ $+ 0.1$ $- 0$	16.0 $0.3 \pm$	1.75 $0.1 \pm$	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	---	---	---