



SamHop Microelectronics Corp.

# STU/D420S

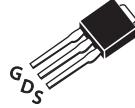
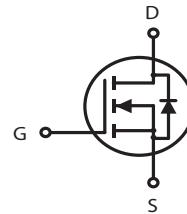
July 05, 2006

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

PRODUCT SUMMARY		
V <sub>DSS</sub>	I <sub>D</sub>	R <sub>D(S(ON))</sub> (mΩ) Max
40V	24A	24 @ V <sub>GS</sub> = 10V
		30 @ V <sub>GS</sub> = 4.5V

### FEATURES

- Super high dense cell design for low R<sub>D(S(ON))</sub>.
- 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<sub>A</sub>=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V <sub>DS</sub>	40	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Drain Current-Continuous <sup>a</sup> @ T <sub>C</sub> =25°C -Pulsed <sup>b</sup>	I <sub>D</sub>	24	A
	I <sub>DM</sub>	75	A
Drain-Source Diode Forward Current	I <sub>S</sub>	8	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 ( $T_C=25^\circ C$  unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ <sup>c</sup>	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	40			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=32V, V_{GS}=0V$		1		$\mu A$
Gate-Body Leakage	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$		$\pm 10$		$\mu A$
<b>ON CHARACTERISTICS <sup>a</sup></b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.9	3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=10A$		17	24	m ohm
		$V_{GS}=4.5V, I_D=8A$		23.5	30	m ohm
On-State Drain Current	$I_{D(ON)}$	$V_{DS}=10V, V_{GS}=10V$	30			A
Forward Transconductance	$g_F$	$V_{DS}=10V, I_D=10A$		16		S
<b>DYNAMIC CHARACTERISTICS <sup>b</sup></b>						
Input Capacitance	$C_{ISS}$	$V_{DS}=15V, V_{GS}=0V$ $f=1.0MHz$		750		pF
Output Capacitance	$C_{OSS}$			110		pF
Reverse Transfer Capacitance	$C_{RSS}$			65		pF
Gate resistance	$R_g$	$V_{GS}=0V, V_{DS}=0V, f=1.0MHz$		3		ohm
<b>SWITCHING CHARACTERISTICS <sup>b</sup></b>						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD}=15V$ $I_D=1A$ $V_{GS}=10V$ $R_{GEN}=3\text{ ohm}$		13		ns
Rise Time	$t_r$			10		ns
Turn-Off Delay Time	$t_{D(OFF)}$			37		ns
Fall Time	$t_f$			12		ns
Total Gate Charge	$Q_g$	$V_{DS}=20V, I_D=10A, V_{GS}=10V$		15		nC
		$V_{DS}=20V, I_D=10A, V_{GS}=-4.5V$		7		nC
Gate-Source Charge	$Q_{gs}$	$V_{DS}=20V, I_D=10A$ $V_{GS}=10V$		2.5		nC
Gate-Drain Charge	$Q_{gd}$			4		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 <sup>a</sup>						
Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0V, I_S = 8A$		0.84	1.3	V

### Notes

a. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

b. Guaranteed by design, not subject to production testing.

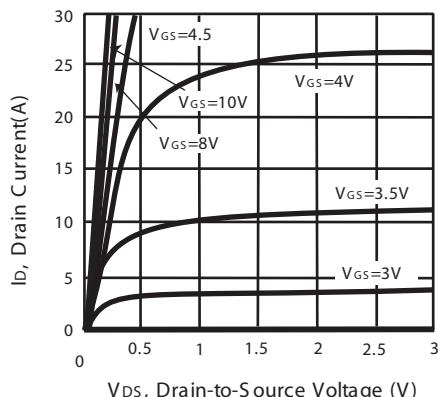


Figure 1. Output Characteristics

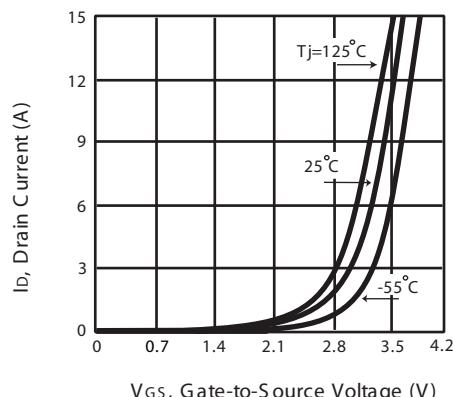


Figure 2. Transfer Characteristics

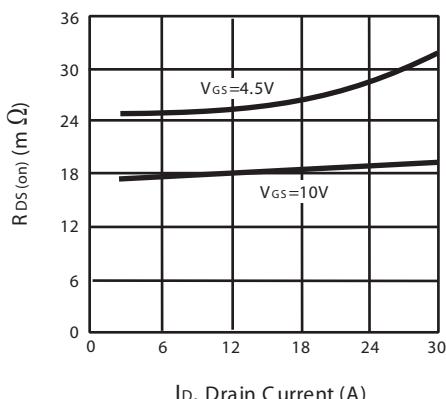


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

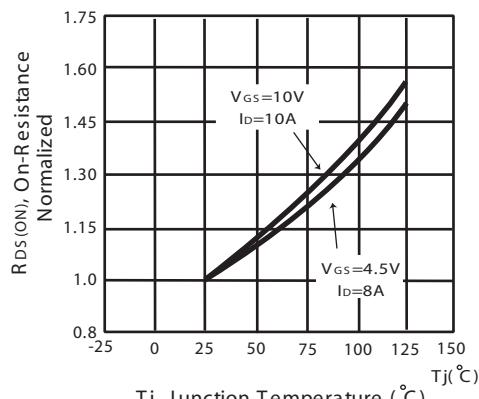


Figure 4. On-Resistance Variation with Drain Current and Temperature

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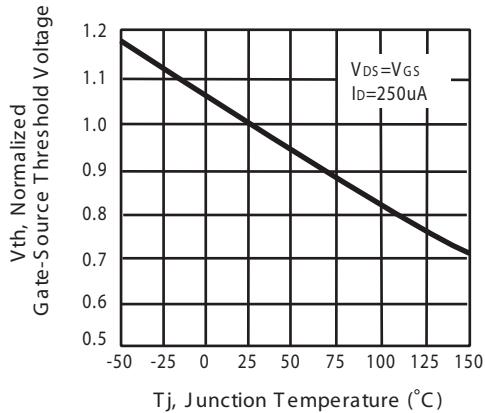


Figure 5. Gate Threshold Variation with Temperature

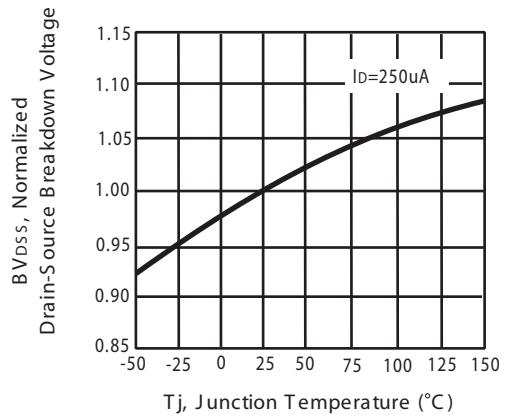


Figure 6. Breakdown Voltage Variation with Temperature

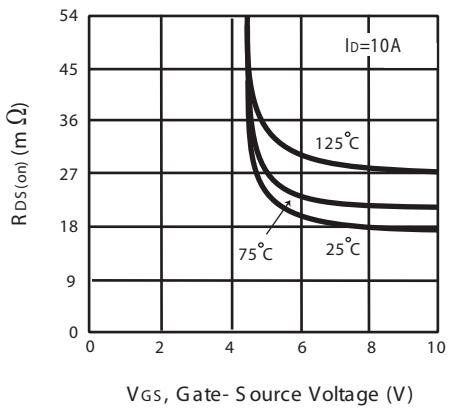


Figure 7. On-Resistance vs. Gate-Source Voltage

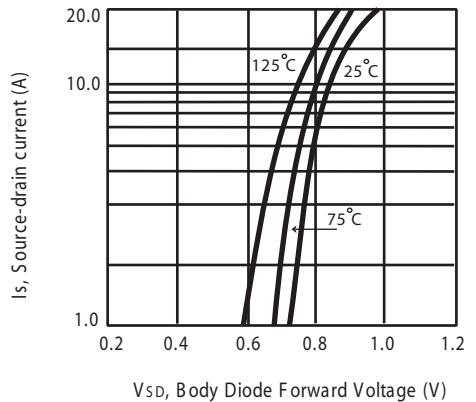


Figure 8. Body Diode Forward Voltage Variation with Source Current

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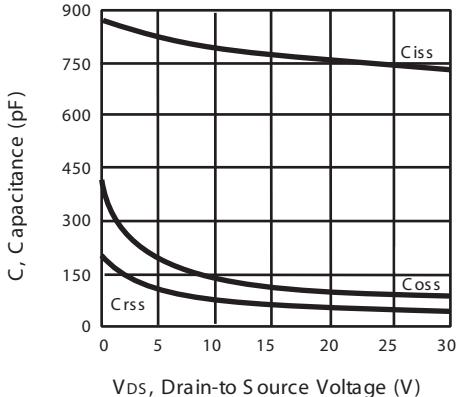


Figure 9. Capacitance

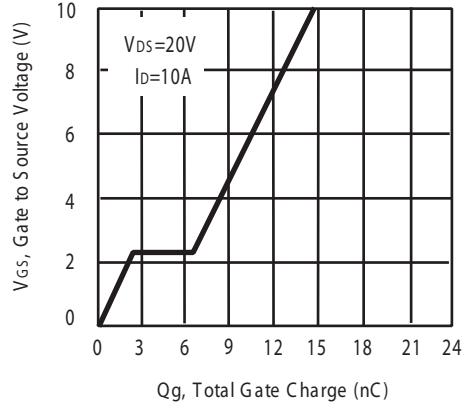


Figure 10. Gate Charge

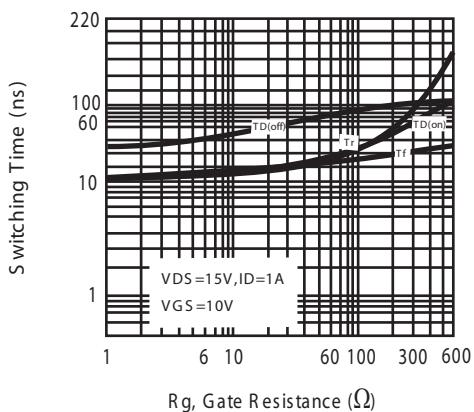


Figure 11. switching characteristics

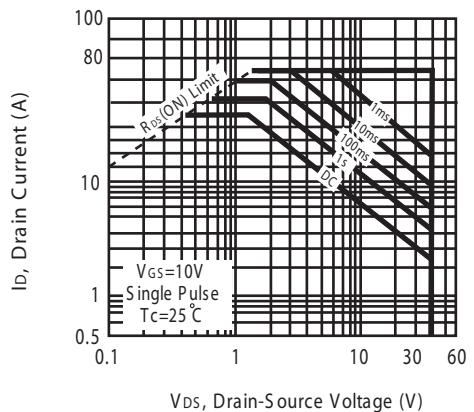


Figure 12. Maximum Safe Operating Area

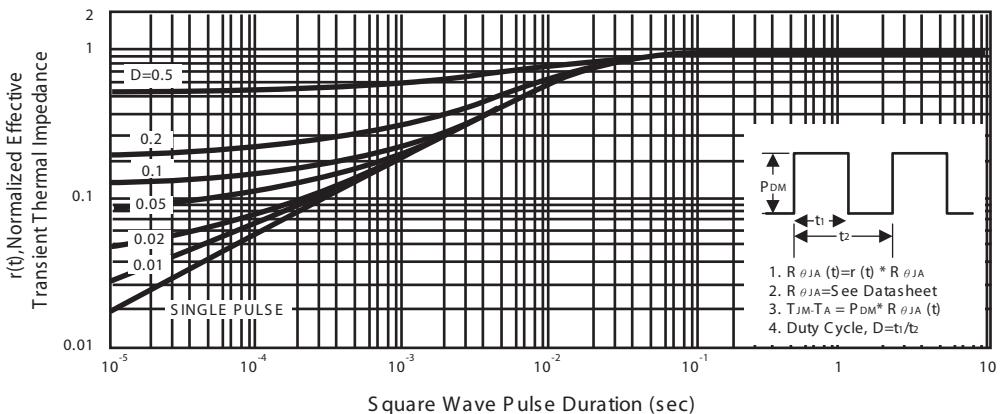
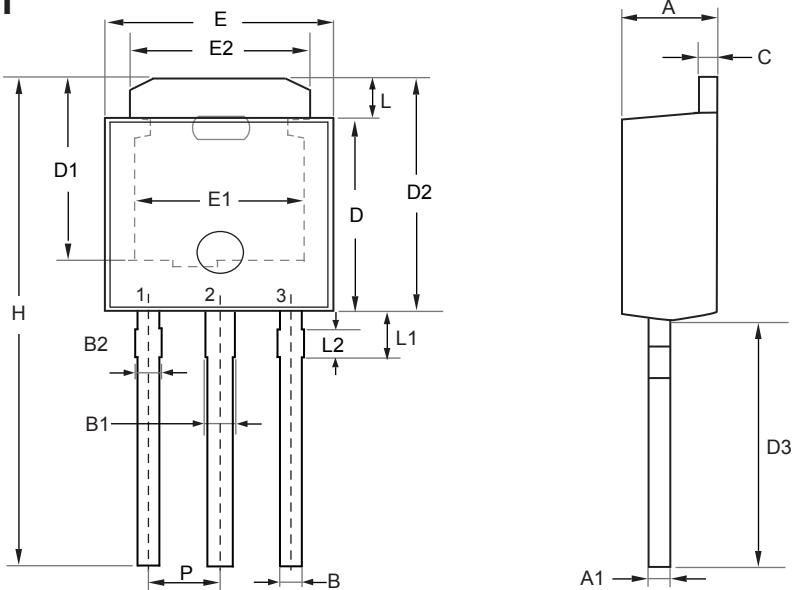


Figure 13. Normalized Thermal Transient Impedance Curve

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## PACKAGE OUTLINE DIMENSIONS

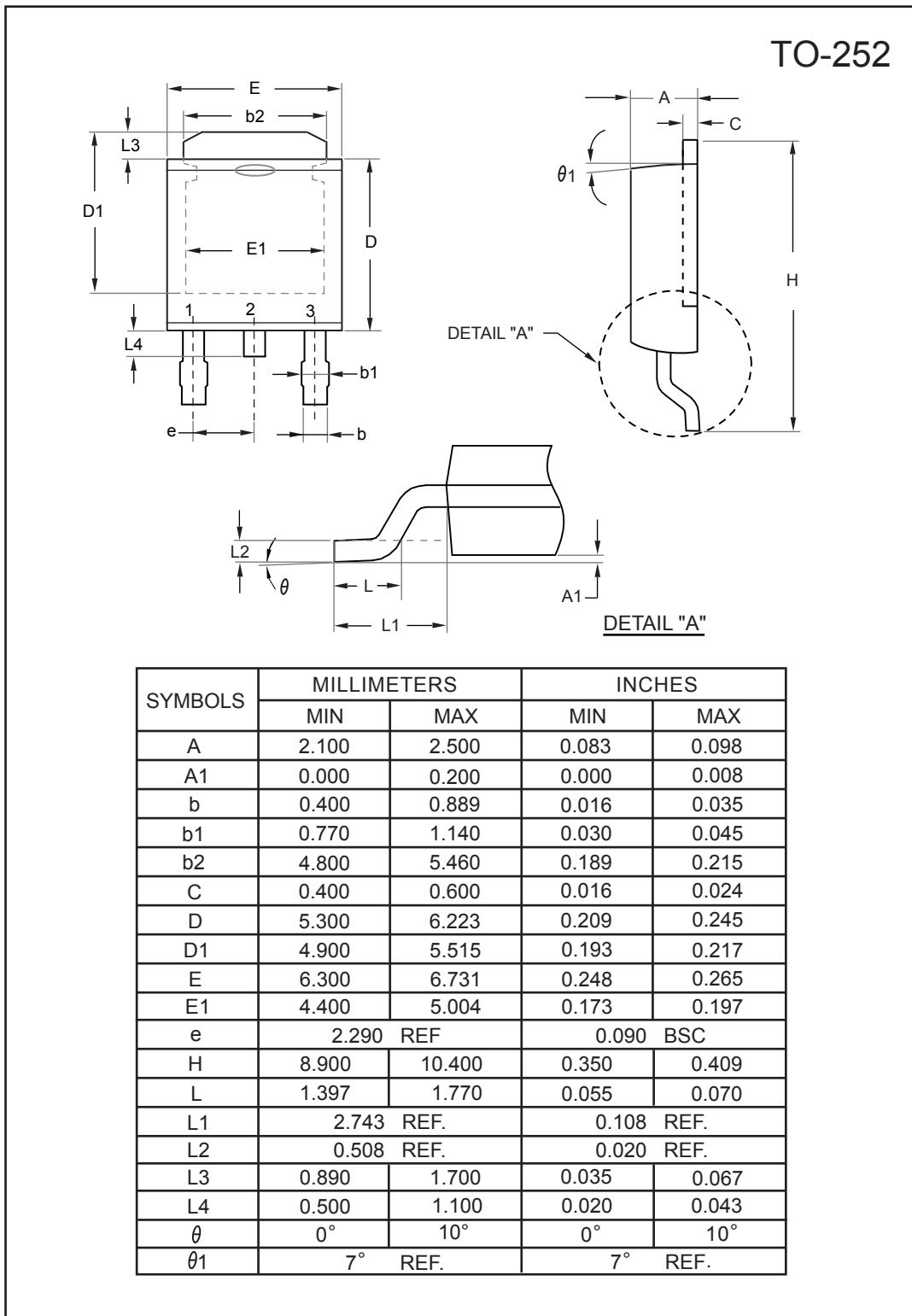
**TO-251**



SYMBOL	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.100	2.500	0.083	0.098
A1	0.350	0.650	0.014	0.026
B	0.400	0.800	0.016	0.031
B1	0.650	1.050	0.026	0.041
B2	0.500	0.900	0.020	0.035
C	0.400	0.600	0.016	0.024
D	5.300	5.700	0.209	0.224
D1	4.900	5.300	0.193	0.209
D2	6.700	7.300	0.264	0.287
D3	7.000	8.000	0.276	0.315
H	13.700	15.300	0.539	0.602
E	6.300	6.700	0.248	0.264
E1	4.600	4.900	0.181	0.193
E2	4.800	5.200	0.189	0.205
L	1.300	1.700	0.051	0.067
L1	1.400	1.800	0.055	0.071
L2	0.500	0.900	0.020	0.035
P	2.300 BSC		0.091 BSC	

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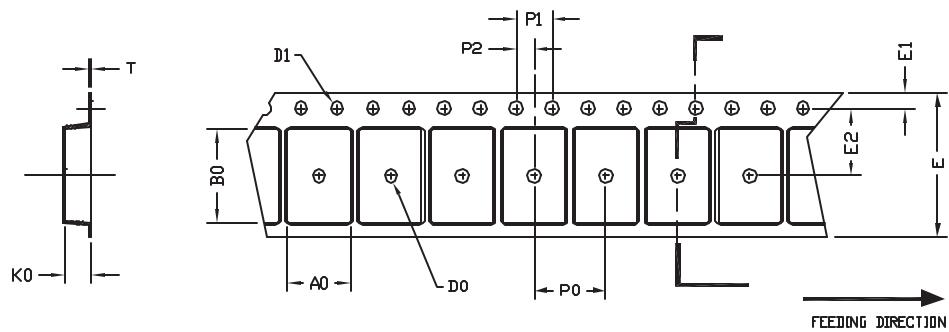
## PACKAGE OUTLINE DIMENSIONS



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## TO-252 Tape and Reel Data

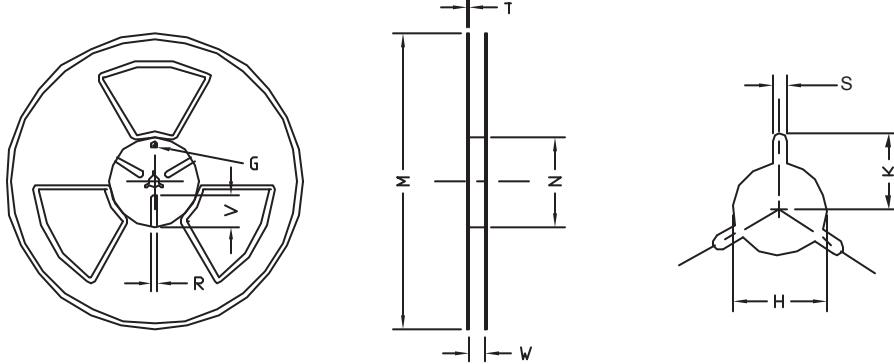
### TO-252 Carrier Tape



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	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	---	---	---