



## 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) Typ
100V	40A	18 @ V <sub>GS</sub> =10V

### FEATURES

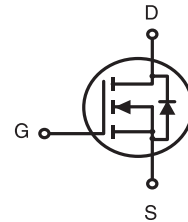
- Super high dense cell design for low R<sub>DS(ON)</sub>.
- Rugged and reliable.
- TO-252 and TO-251 Package.



STU SERIES  
TO-252AA(D-PAK)



STD SERIES  
TO-251(I-PAK)



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

Symbol	Parameter		Limit	Units
V <sub>DS</sub>	Drain-Source Voltage		100	V
V <sub>GS</sub>	Gate-Source Voltage		±20	V
I <sub>D</sub>	Drain Current-Continuous <sup>a e</sup>	T <sub>C</sub> =25°C	40	A
		T <sub>C</sub> =70°C	33.5	A
I <sub>DM</sub>	-Pulsed <sup>b</sup>		117	A
E <sub>AS</sub>	Single Pulse Avalanche Energy <sup>d</sup>		306	mJ
P <sub>D</sub>	Maximum Power Dissipation	T <sub>C</sub> =25°C	60	W
		T <sub>C</sub> =70°C	42	W
T <sub>J</sub> , T <sub>STG</sub>	Operating Junction and Storage Temperature Range		-55 to 175	°C

### THERMAL CHARACTERISTICS

R <sub>θJC</sub>	Thermal Resistance, Junction-to-Case	2.5	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient	50	°C/W

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V , I <sub>D</sub> =250uA	100			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =80V , V <sub>GS</sub> =0V			1	uA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> = ±20V , V <sub>DS</sub> =0V			±100	nA
ON CHARACTERISTICS						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	1	2	3	V
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =10V , I <sub>D</sub> =20A		18	23	m ohm
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =10V , I <sub>D</sub> =20A		17		S
DYNAMIC CHARACTERISTICS °						
C <sub>ISS</sub>	Input Capacitance	V <sub>DS</sub> =25V,V <sub>GS</sub> =0V f=1.0MHz		2560		pF
C <sub>OSS</sub>	Output Capacitance			247		pF
C <sub>RSS</sub>	Reverse Transfer Capacitance			180		pF
SWITCHING CHARACTERISTICS °						
t <sub>d(ON)</sub>	Turn-On Delay Time	V <sub>DD</sub> =50V I <sub>D</sub> =1A V <sub>GS</sub> =10V R <sub>GEN</sub> = 6 ohm		54		ns
t <sub>r</sub>	Rise Time			73		ns
t <sub>d(OFF)</sub>	Turn-Off Delay Time			78		ns
t <sub>f</sub>	Fall Time			40		ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =50V,I <sub>D</sub> =20A,V <sub>GS</sub> =10V		32		nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =50V,I <sub>D</sub> =20A, V <sub>GS</sub> =10V		4		nC
Q <sub>gd</sub>	Gate-Drain Charge			16		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V,I <sub>S</sub> =6A		0.78	1.3	V
Notes						
a.Surface Mounted on FR4 Board,t ≤ 10sec.						
b.Pulse Test:Pulse Width ≤ 300us, Duty Cycle ≤ 2%.						
c.Guaranteed by design, not subject to production testing.						
d.Starting T <sub>J</sub> =25°C,L=0.5mH,V <sub>DD</sub> = 50V.(See Figure13)						
e.Drain current limited by maximum junction temperature.						

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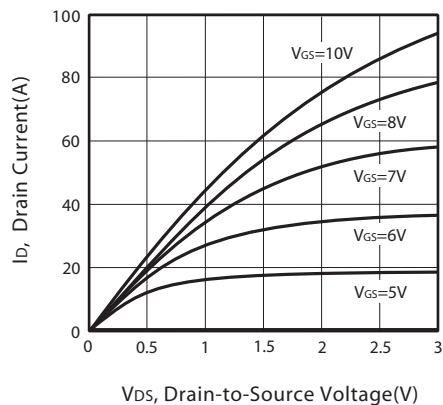


Figure 1. Output Characteristics

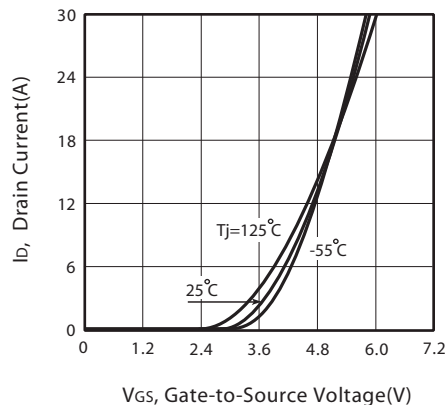


Figure 2. Transfer Characteristics

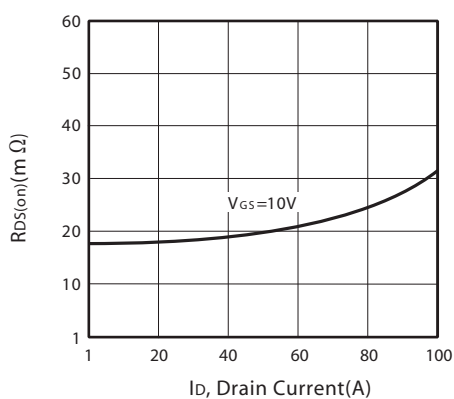


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

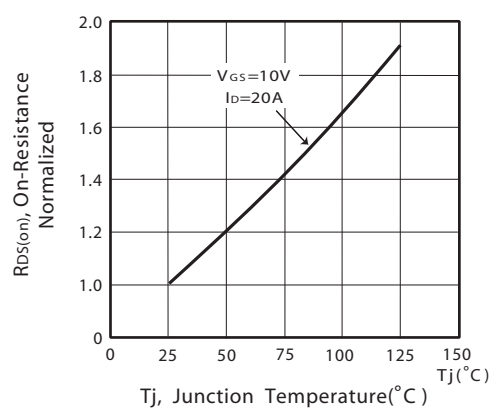


Figure 4. On-Resistance Variation with Drain Current and Temperature

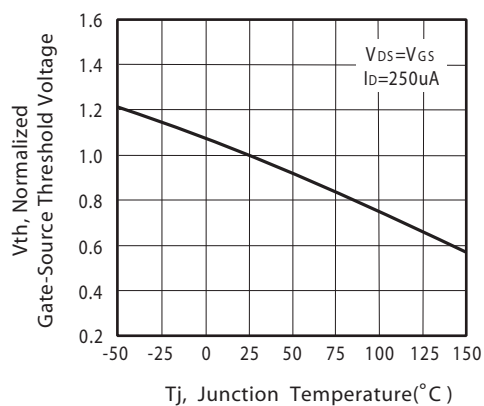


Figure 5. Gate Threshold Variation with Temperature

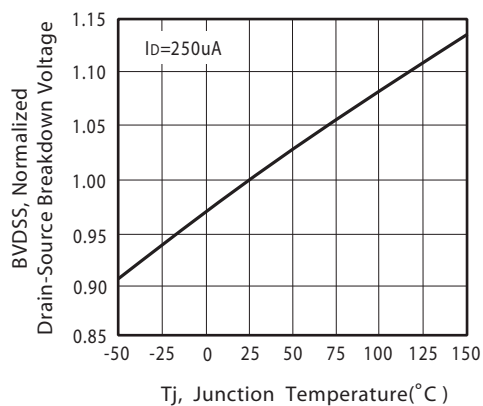


Figure 6. Breakdown Voltage Variation with Temperature

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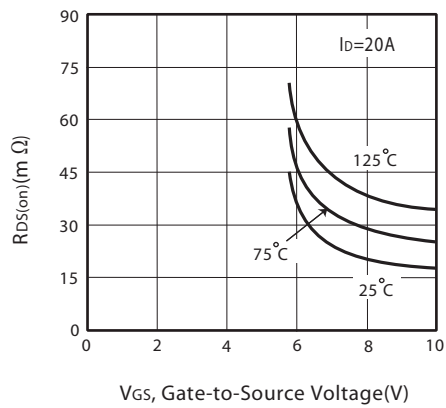


Figure 7. On-Resistance vs. Gate-Source Voltage

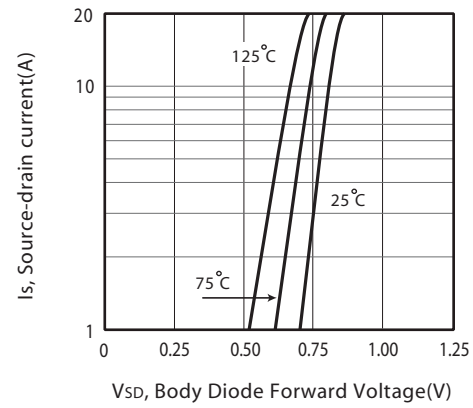


Figure 8. Body Diode Forward Voltage Variation with Source Current

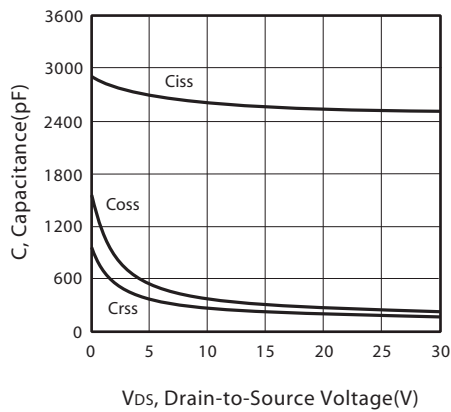


Figure 9. Capacitance

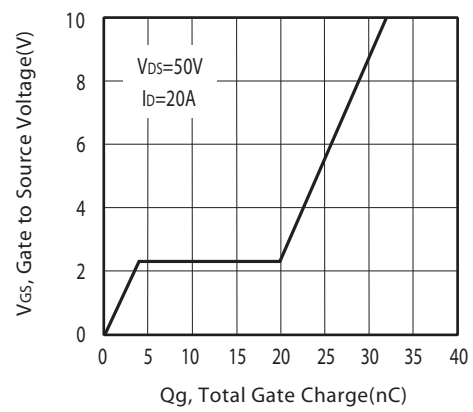


Figure 10. Gate Charge

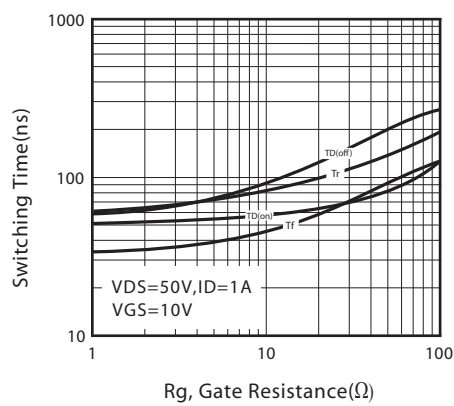


Figure 11. switching characteristics

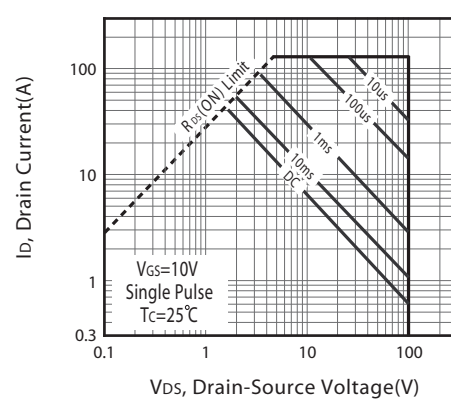


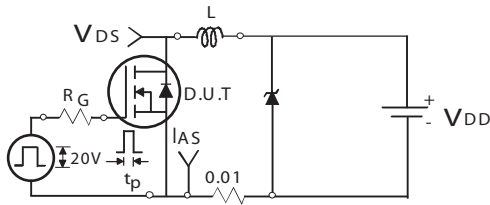
Figure 12. Maximum Safe Operating Area

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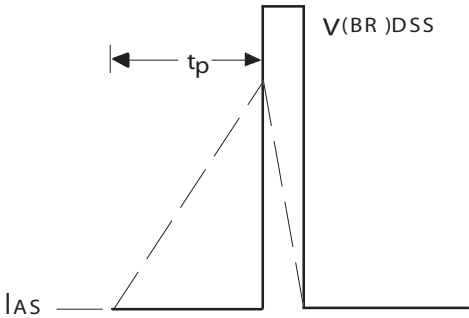
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Unclamped Inductive Test Circuit

Figure 13a.



Unclamped Inductive Waveforms

Figure 13b.

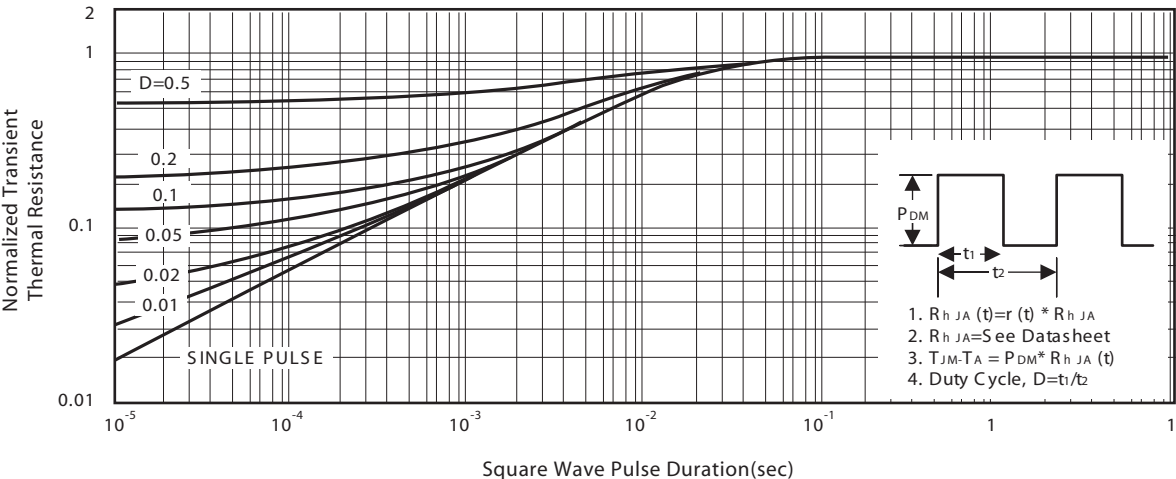


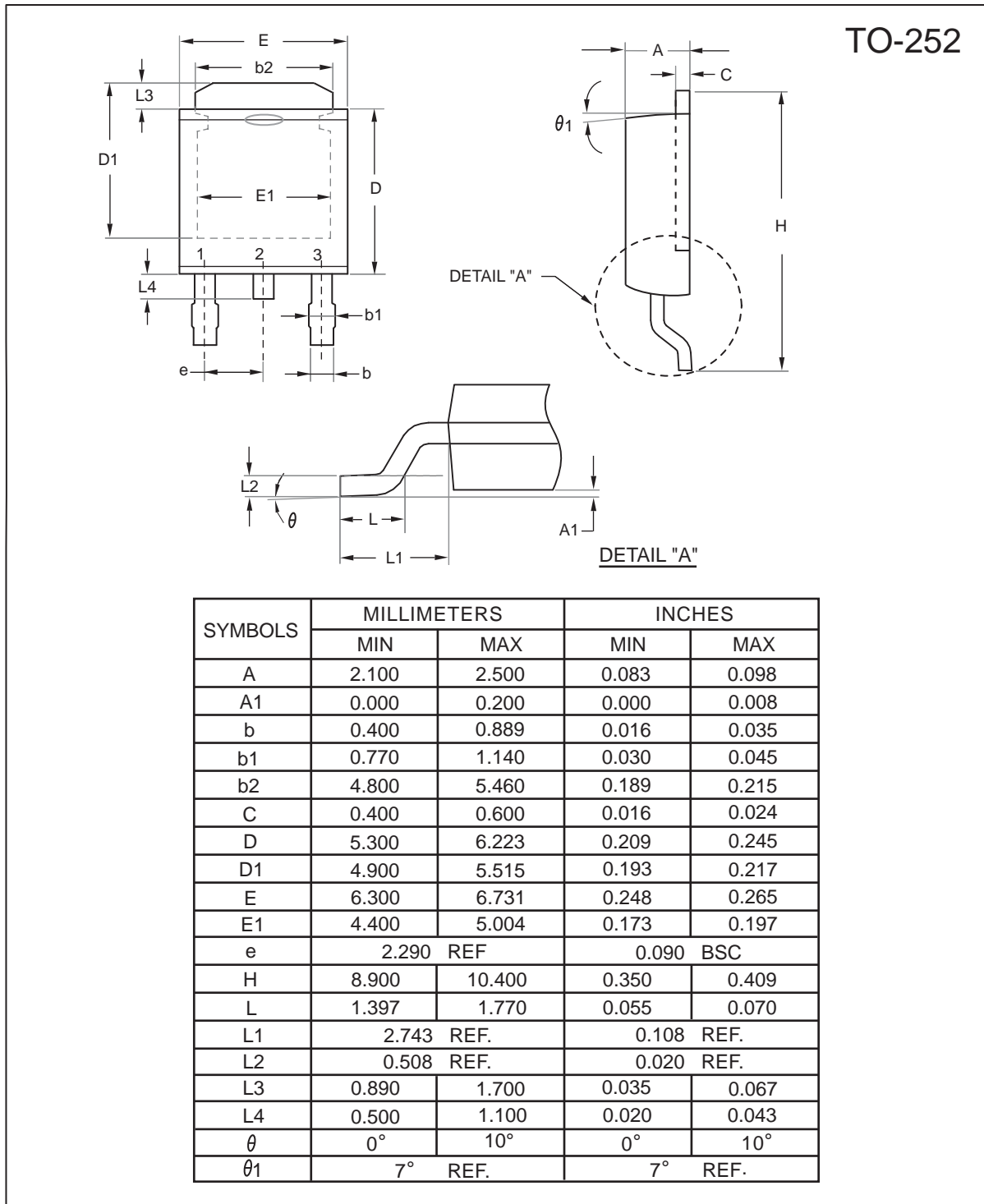
Figure 14. Normalized Thermal Transient Impedance Curve

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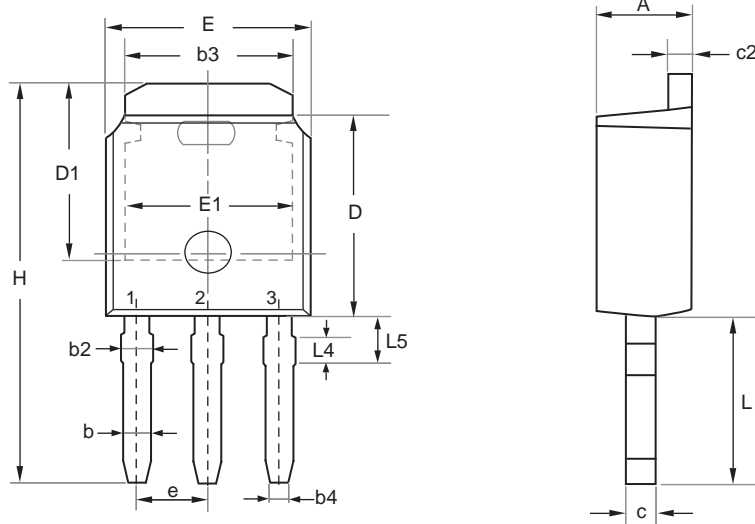
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### PACKAGE OUTLINE DIMENSIONS

#### TO-251



SYMBOL	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
E	6.400	6.731	0.252	0.265
L	3.980	4.280	0.157	0.169
L4	0.698 REF		0.027 REF	
L5	0.972	1.226	0.038	0.048
D	6.000	6.223	0.236	0.245
H	11.050	11.450	0.435	0.450
b	0.640	0.880	0.025	0.035
b2	0.770	1.140	0.030	0.045
b3	5.210	5.460	0.205	0.215
b4	0.450	0.550	0.018	0.022
e	2.286 BSC		0.090 BSC	
A	2.200	2.380	0.087	0.094
c	0.400	0.600	0.016	0.024
c2	0.400	0.600	0.016	0.024
D1	5.100	---	0.201	---
E1	4.400	---	0.173	---

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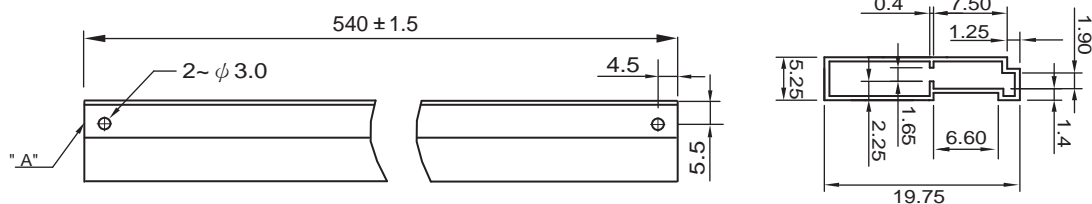
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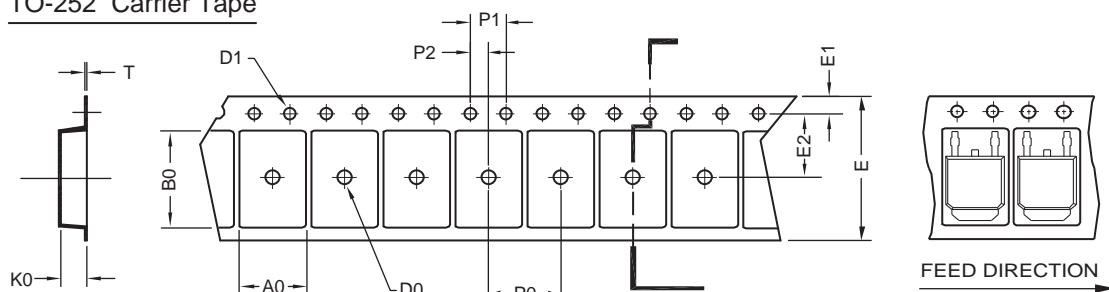
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### TO-251 Tube/TO-252 Tape and Reel Data

#### TO-251 Tube



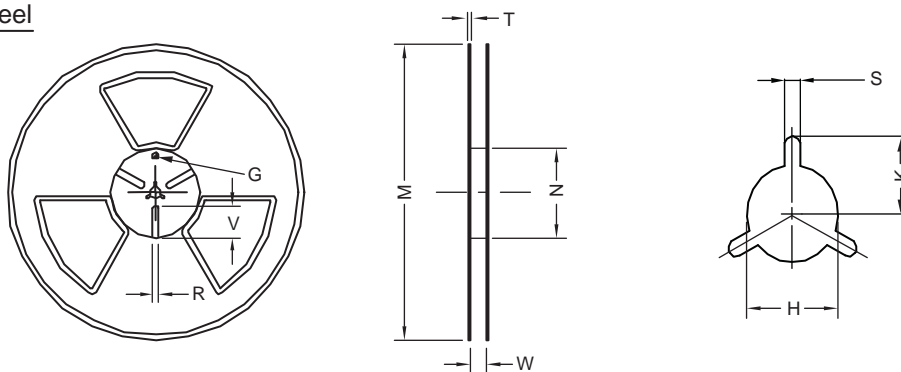
#### TO-252 Carrier Tape



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	---	---	---

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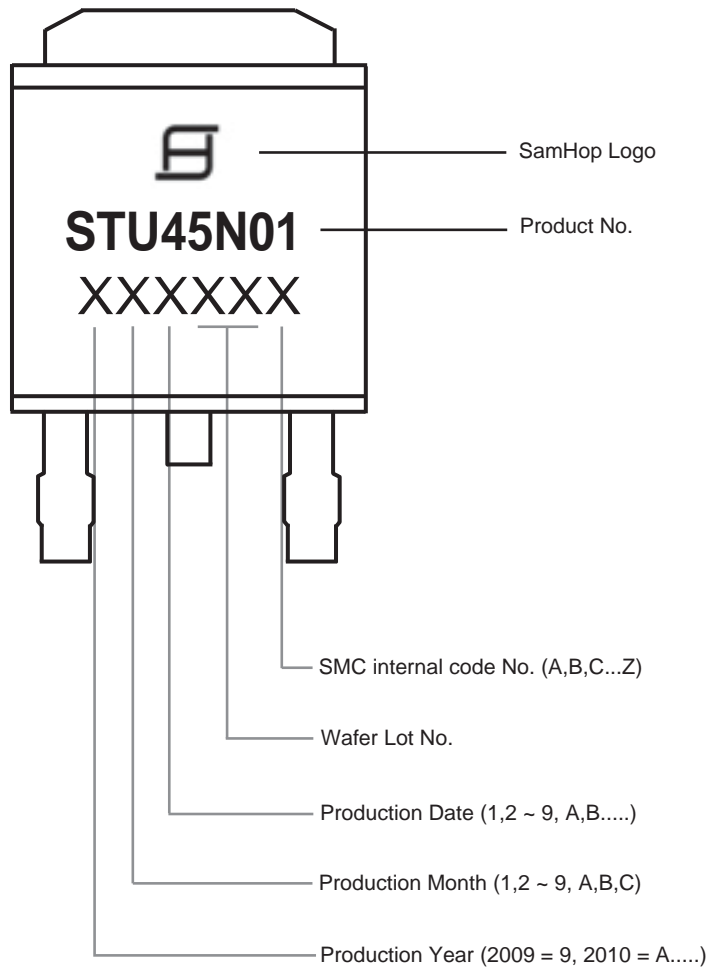
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### TOP MARKING DEFINITION

#### TO-252



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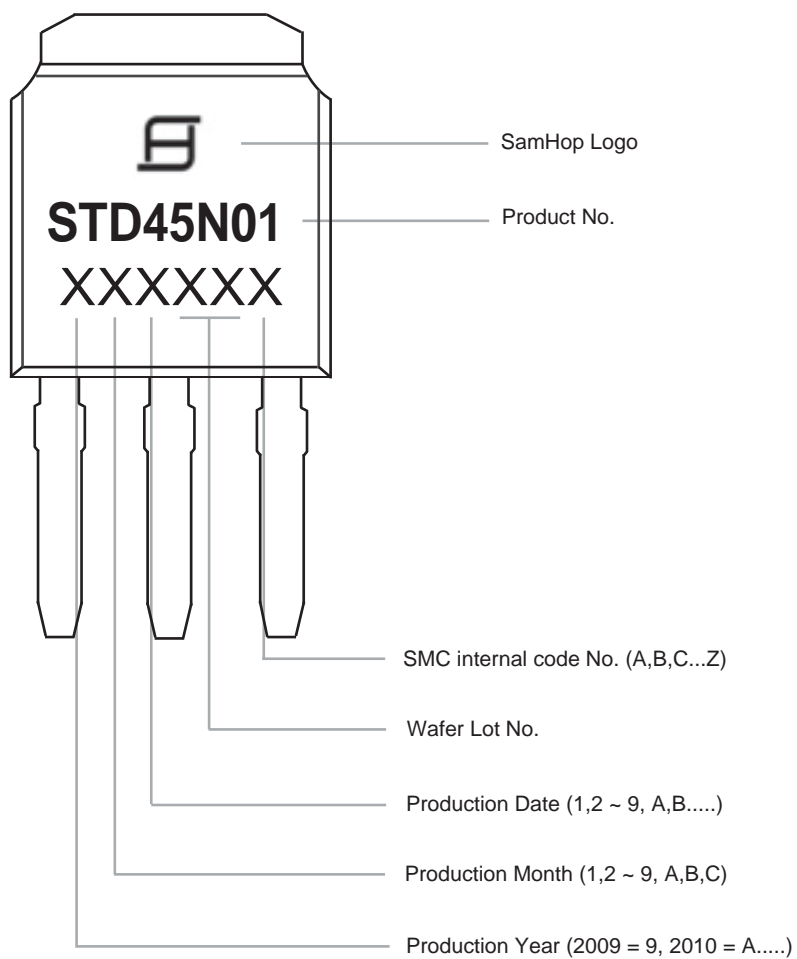
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