



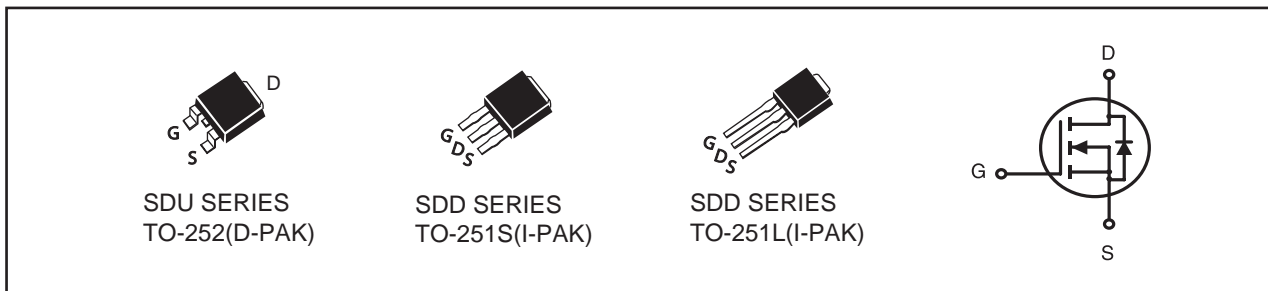
N-Channel Logic Level Enhancement Mode Field Effect Transistor

PRODUCT SUMMARY

V _{DSS}	I _D	R _{DS(ON)} (Ω) Typ
650V	4A	2.5 @V _{GS} =10V

FEATURES

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



ORDERING INFORMATION

Ordering Code	Package	Marking Code	Delivery Mode	RoHS Status
SDU04N65HZ	TO-252	SDU04N65	Reel	Halogen Free
SDD04N65HS	TO-251S	SDD04N65	Tube	Halogen Free
SDD04N65HL	TO-251L	SDD04N65	Tube	Halogen Free

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

Symbol	Parameter	Limit	Units
V _{DS}	Drain-Source Voltage	650	V
V _{GS}	Gate-Source Voltage	±30	V
I _D	Drain Current-Continuous ^{a e}	T _C =25°C	4
		T _C =100°C	2.8
I _{DM}	-Pulsed ^b	11	A
E _{AS}	Single Pulse Avalanche Energy ^d	100	mJ
P _D	Maximum Power Dissipation	T _C =25°C	83
		T _C =100°C	42
T _J , T _{STG}	Operating Junction and Storage Temperature Range	-55 to 175	°C

THERMAL CHARACTERISTICS

R _{θ JC}	Thermal Resistance, Junction-to-Case	1.8	°C/W
R _{θ JA}	Thermal Resistance, Junction-to-Ambient	50	°C/W

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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	650			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =520V , V _{GS} =0V			1	uA
I _{GSS}	Gate-Body Leakage Current	V _{GS} = ±30V , V _{DS} =0V			±100	nA
ON CHARACTERISTICS						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	2	3	4	V
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =10V , I _D =2A		2.5	3.2	ohm
g _{FS}	Forward Transconductance	V _{DS} =20V , I _D =2A		3.3		S
DYNAMIC CHARACTERISTICS[°]						
C _{ISS}	Input Capacitance	V _{DS} =25V, V _{GS} =0V f=1.0MHz		490		pF
C _{OSS}	Output Capacitance			54		pF
C _{RSS}	Reverse Transfer Capacitance			12		pF
SWITCHING CHARACTERISTICS[°]						
t _{D(ON)}	Turn-On Delay Time	V _{DD} =325V I _D =1A V _{GS} =10V R _{GEN} =6 ohm		23		ns
t _r	Rise Time			17		ns
t _{D(OFF)}	Turn-Off Delay Time			29		ns
t _f	Fall Time			12		ns
Q _g	Total Gate Charge	V _{DS} =325V, I _D =1A, V _{GS} =10V		8.2		nC
Q _{gs}	Gate-Source Charge	V _{DS} =325V, I _D =1A, V _{GS} =10V		1.7		nC
Q _{gd}	Gate-Drain Charge			3.8		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _S =2A		0.81	1.4	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=50mH, V_{DD} = 50V. (See Figure13)
- Drain current limited by maximum junction temperature.

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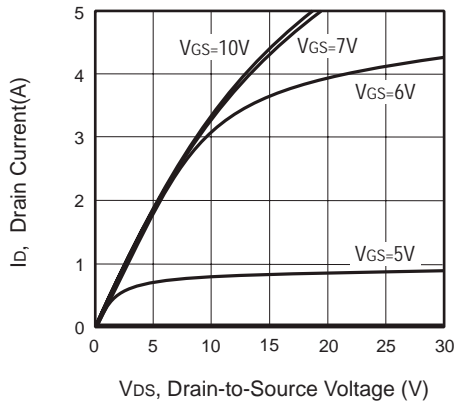


Figure 1. Output Characteristics

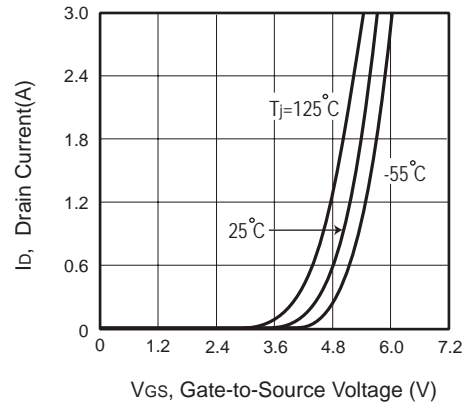


Figure 2. Transfer Characteristics

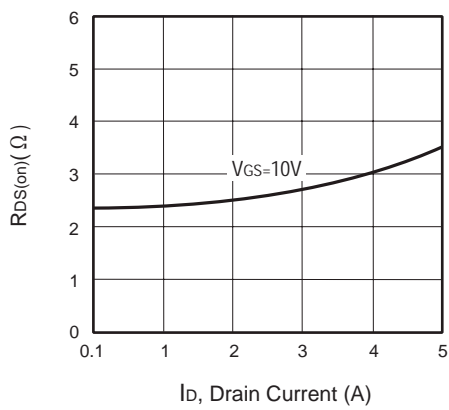


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

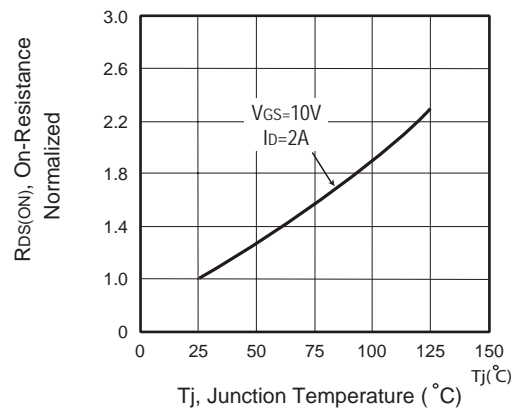


Figure 4. On-Resistance Variation with Drain Current and Temperature

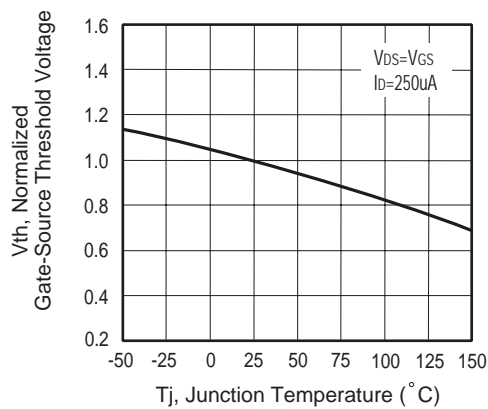


Figure 5. Gate Threshold Variation with Temperature

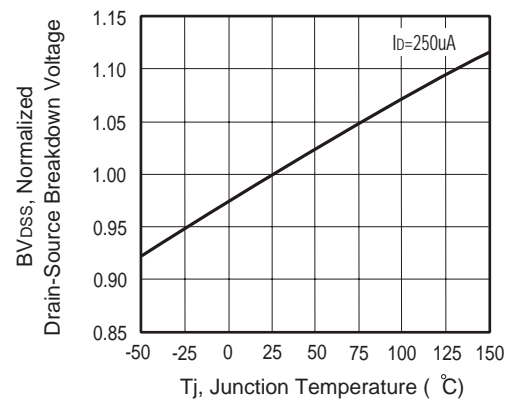


Figure 6. Breakdown Voltage Variation with Temperature

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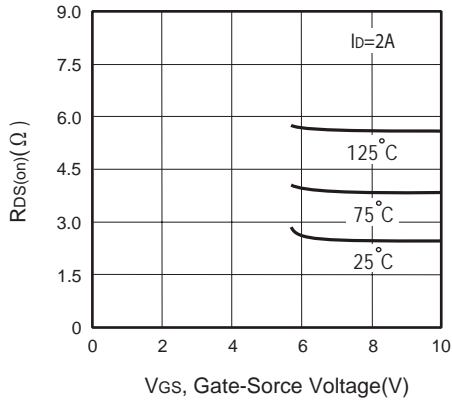


Figure 7. On-Resistance vs. Gate-Source Voltage

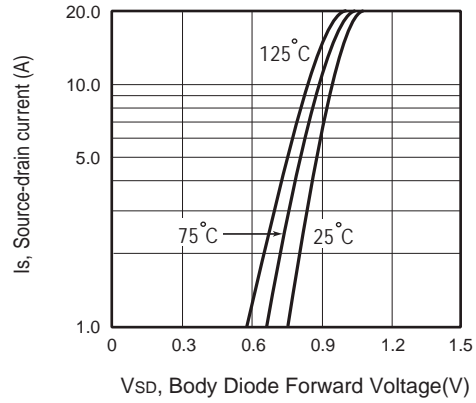


Figure 8. Body Diode Forward Voltage Variation with Source Current

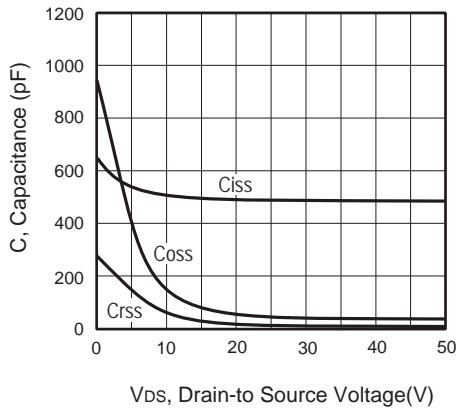


Figure 9. Capacitance

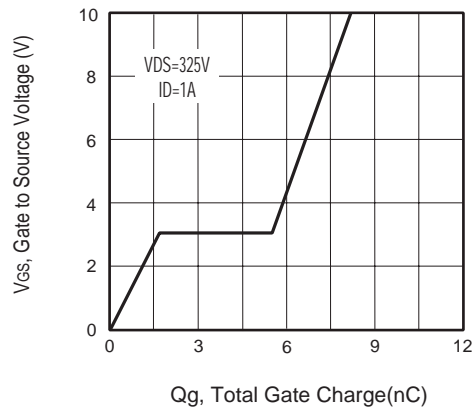


Figure 10. Gate Charge

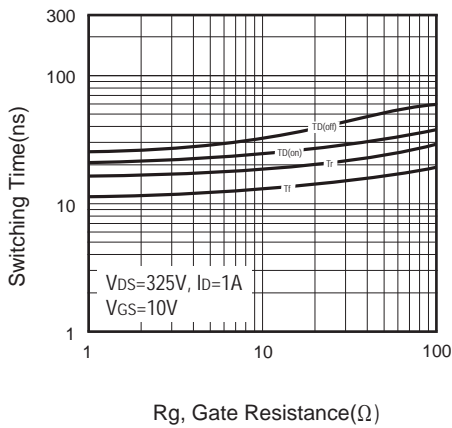


Figure 11. switching characteristics

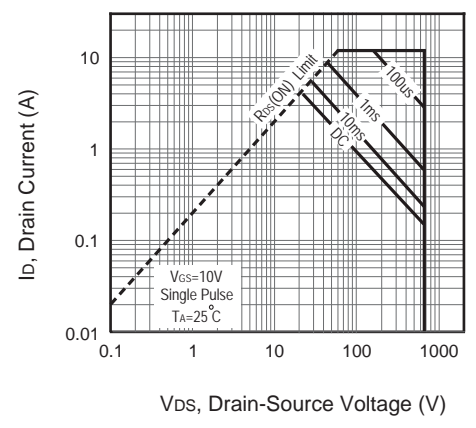
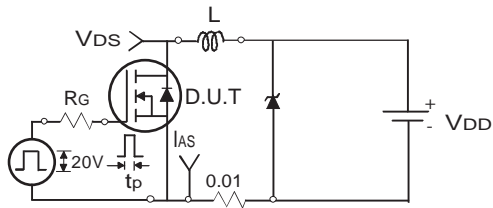


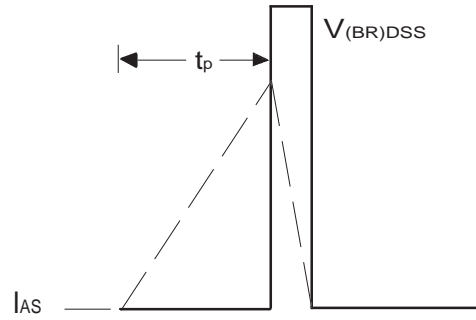
Figure 12. Maximum Safe Operating Area

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Uncamped Inductive Test Circuit

Figure 13a.



Unclamped Inductive Waveforms

Figure 13b.

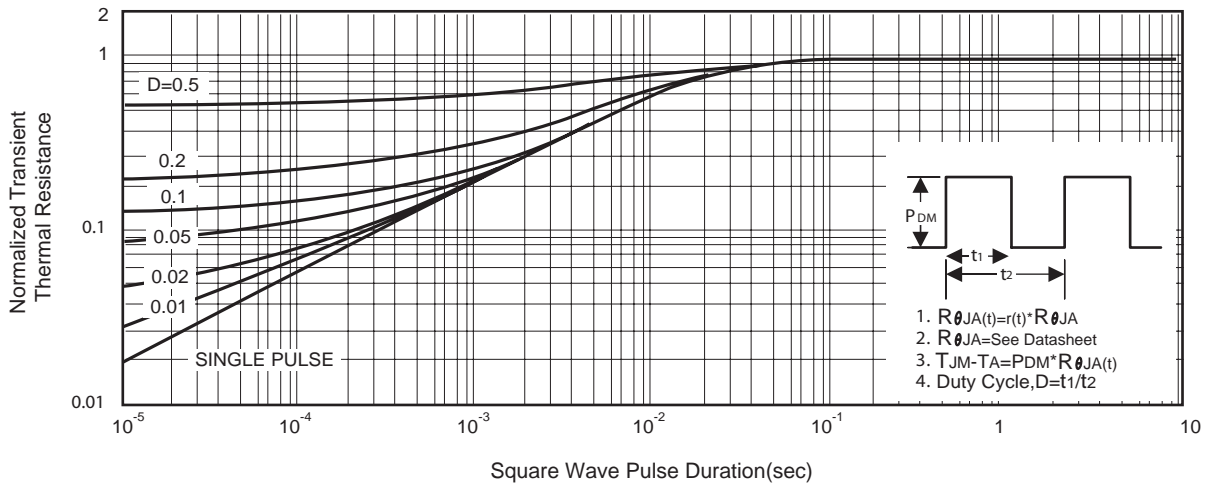
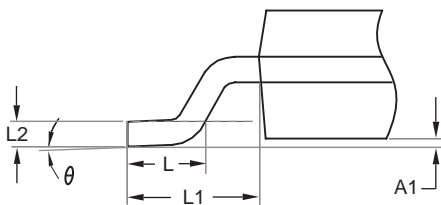
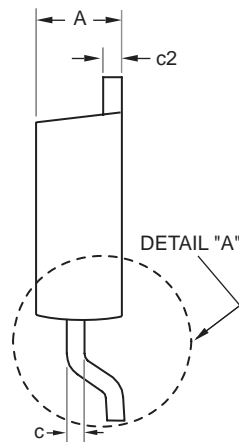
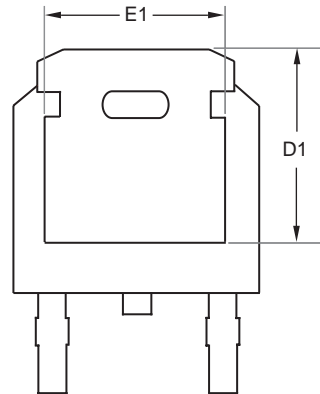
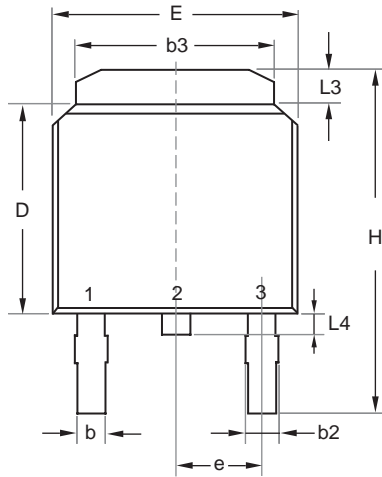


Figure 14. Normalized Thermal Transient Impedance Curve

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TO-252



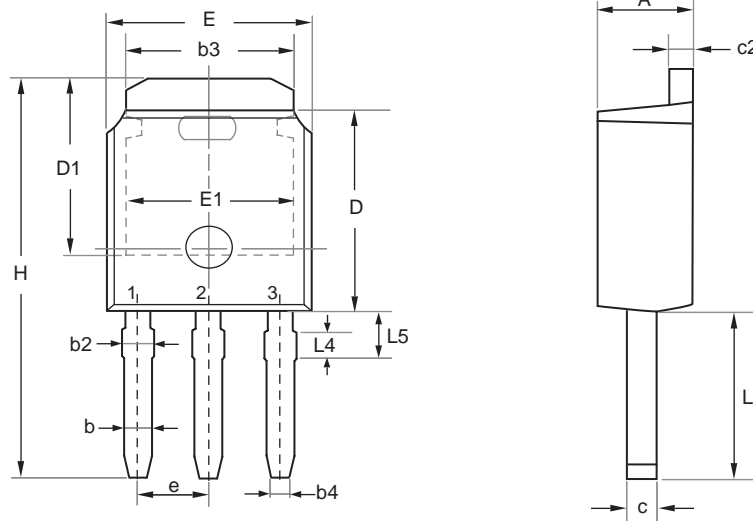
DETAIL "A"

SYMBOLS	MILLIMETERS	
	MIN	MAX
A	2.200	2.380
A1	0.000	0.127
b	0.635	0.889
b2	0.762	1.143
b3	5.200	5.460
c	0.450	0.600
c2	0.450	0.580
D	6.000	6.223
D1	5.210	5.380
e	2.286 BSC	
E	6.400	6.731
E1	4.318	4.900
H	9.400	10.400
L	1.400	1.770
L1	2.743 REF	
L2	0.508 BSC	
L3	0.890	1.270
L4	0.640	1.010
θ	0°	10°

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PACKAGE OUTLINE DIMENSIONS

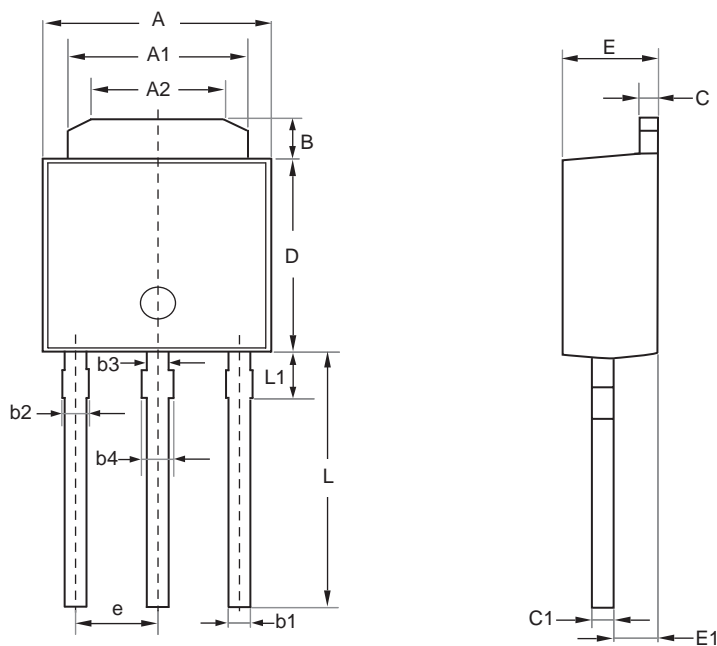
TO-251S



SYMBOL	MILLIMETERS	
	MIN	MAX
E	6.350	6.731
L	3.700	4.400
L4	0.698 REF	
L5	0.972	1.226
D	5.970	6.223
H	9.670	11.450
b	0.630	0.850
b2	0.760	1.140
b3	4.950	5.460
b4	0.450	0.550
e	2.286 BSC	
A	2.180	2.390
c	0.400	0.610
c2	0.400	0.610
D1	5.100	---
E1	4.318	---

PACKAGE OUTLINE DIMENSIONS

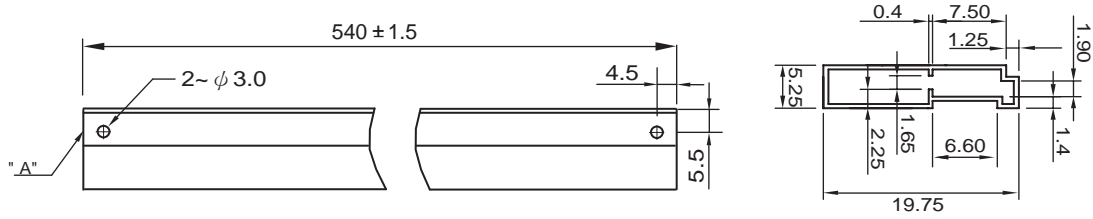
TO-251L



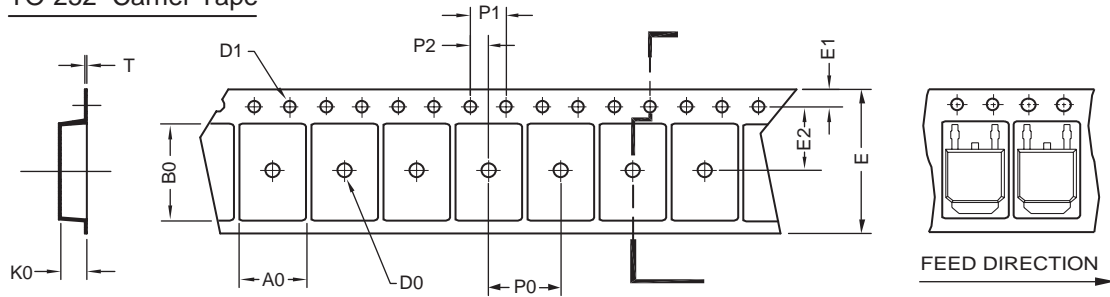
SYMBOL	MILLIMETERS		
	MIN	NOM	MAX
A	6.40	6.50	6.60
A1	5.30	5.40	5.50
A2	4.30	4.40	4.50
B	1.35	1.50	1.65
L1	1.55 REF		
L	7.40	7.70	8.00
D	5.40	5.55	5.70
C	0.55	0.60	0.65
C1	0.49	0.54	0.59
E1	1.72	1.77	1.82
E	2.20	2.30	2.40
b1	0.60	—	0.75
b2	0.70	—	0.85
b3	0.80		
b4	0.90		
e	2.30		

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

TO-251 Tube



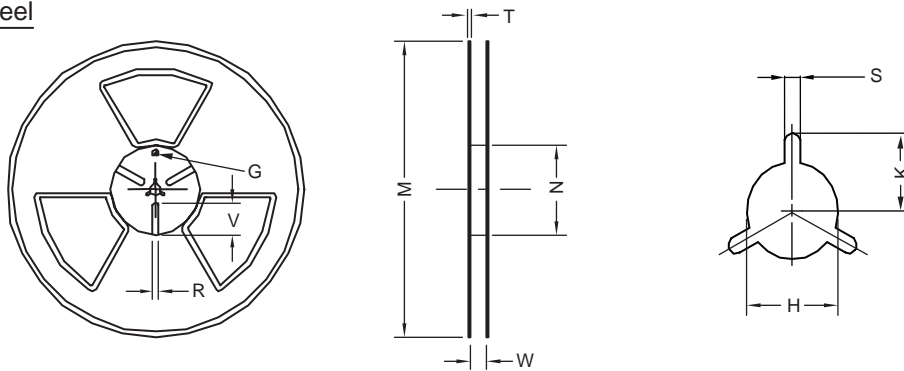
TO-252 Carrier Tape



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

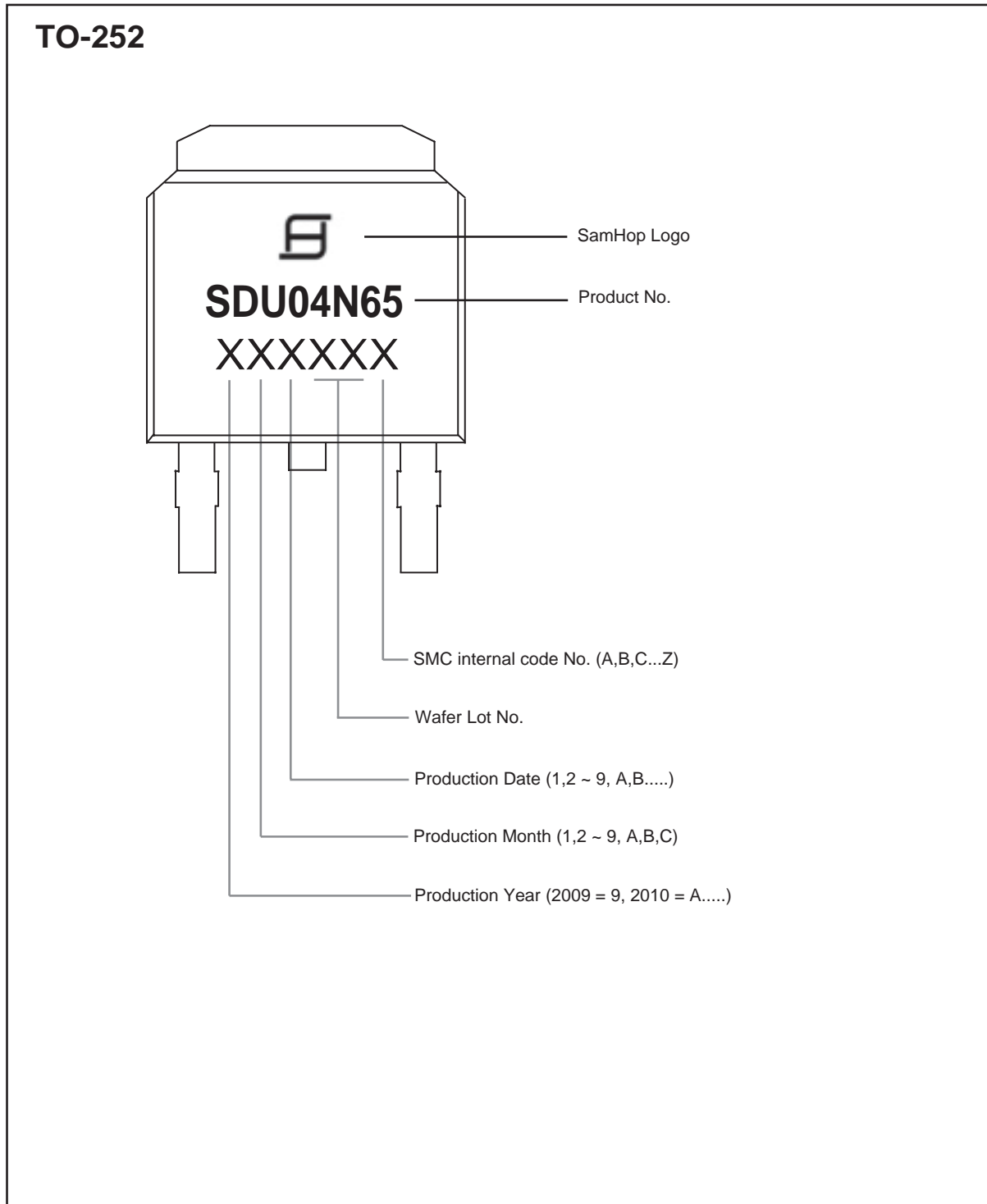
TO-252 Reel



UNIT:mm

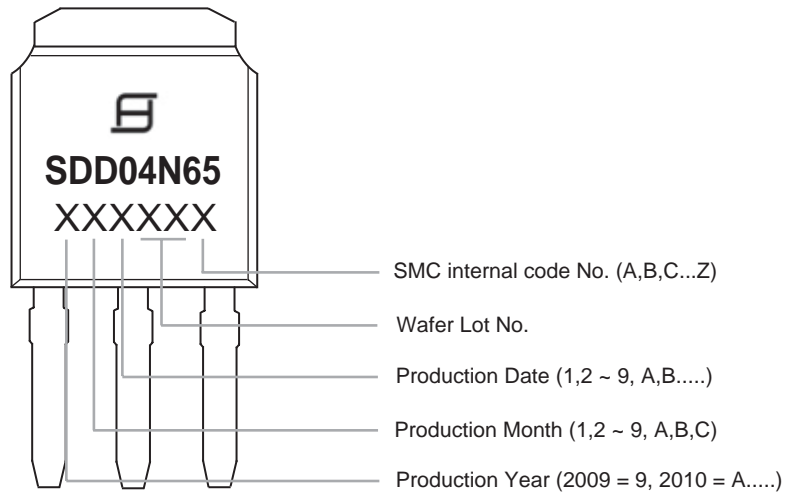
TAPE SIZE	REEL SIZE	M	N	W	T	H	K	S	G	R	V
16 mm	φ 330	φ 330 ± 0.5	φ 97 ± 1.0	17.0 + 1.5 - 0	2.2	φ 13.0 + 0.5 - 0.2	10.6	2.0 ±0.5	---	---	---

TOP MARKING DEFINITION



TOP MARKING DEFINITION

TO-251S



TO-251L

