

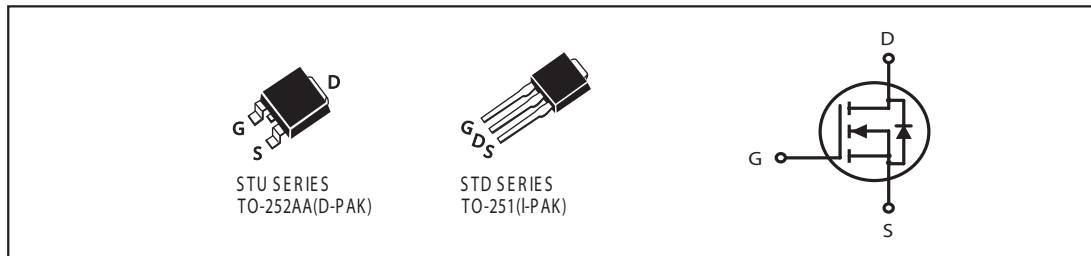


N-Channel Enhancement Mode Field Effect Transistor

PRODUCT SUMMARY		
V _{DSS}	I _D	R _{DS(ON)} (mΩ) Max
40V	10A	35@ V _{GS} = 10V
		60@ V _{GS} = 4.5V

FEATURES

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



ABSOLUTE MAXIMUM RATINGS (T_A=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	25°C	10	A
		70°C	8.3	A
-Pulsed ^b	I _{DM}	40	A	
Drain-Source Diode Forward Current ^a	I _S	15	A	
Maximum Power Dissipation ^a	P _D	T _a = 25°C	50	W
		T _a =70°C	35	
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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N-Channel ELECTRICAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ ^c	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^b						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250uA	1.0	1.8	3.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} = 10V, I _D = 10A		25	35	m ohm
		V _{GS} = 4.5V, I _D = 8A		45	60	m ohm
On-State Drain Current	I _{D(ON)}	V _{DS} = 5V, V _{GS} = 10V	20			A
Forward Transconductance	g _{FS}	V _{DS} = 10V, I _D = 10A		12		S
DYNAMIC CHARACTERISTICS^c						
Input Capacitance	C _{ISS}	V _{DS} = 25V, V _{GS} = 0V f = 1.0MHz		840	950	pF
Output Capacitance	C _{OSS}			85	98	pF
Reverse Transfer Capacitance	C _{RSS}			70	82	pF
Gate resistance	R _g	V _{GS} = 0V, V _{DS} = 0V, f = 1.0MHz		2.5		ohm
SWITCHING CHARACTERISTICS^c						
Turn-On Delay Time	t _{D(ON)}	V _{DD} = 20V I _D = 1 A V _{GS} = 4.5V R _{GEN} = 3.3 ohm		15.2	18	ns
Rise Time	t _r			4.8	5.6	ns
Turn-Off Delay Time	t _{D(OFF)}			18.6	22	ns
Fall Time	t _f			12.1	14	ns
Total Gate Charge	Q _g	V _{DS} = 20V, I _D = 10A, V _{GS} = 10V		18.7	22	nC
		V _{DS} = 20V, I _D = 10A, V _{GS} = 4.5V		8.9	10	nC
Gate-Source Charge	Q _{gs}	V _{DS} = 20V, I _D = 10A		3.9	4.6	nC
Gate-Drain Charge	Q _{gd}	V _{GS} = 10V		3.1	3.6	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}	$V_{GS} = 0V, I_s = 15A$		1	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.

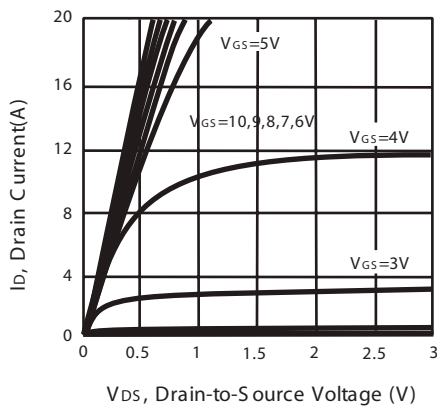


Figure 1. Output C characteristics

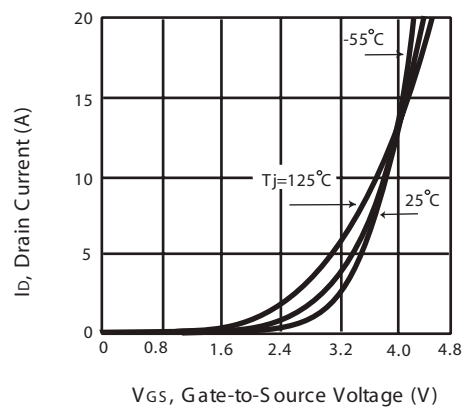


Figure 2. Transfer C characteristics

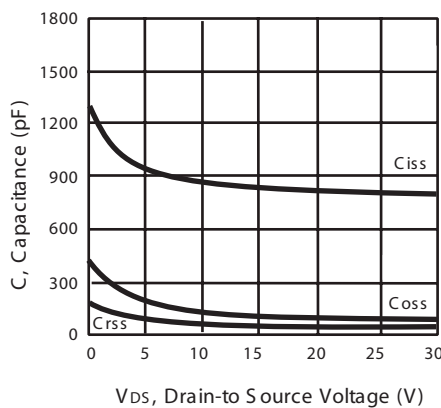


Figure 3. Capacitance

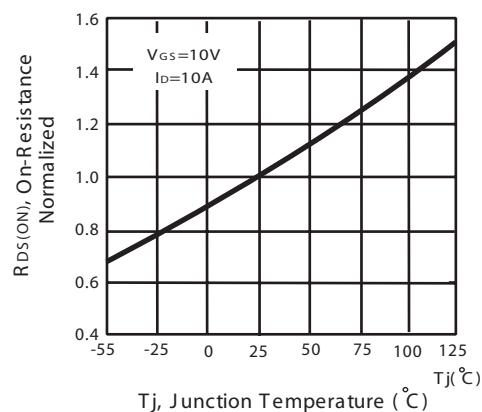


Figure 4. On-Resistance Variation with Drain Current and Temperature

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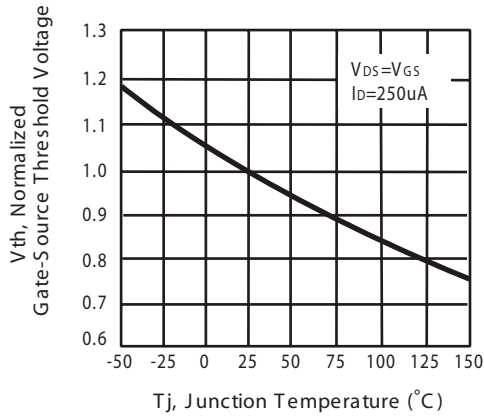


Figure 5. Gate Threshold Variation with Temperature

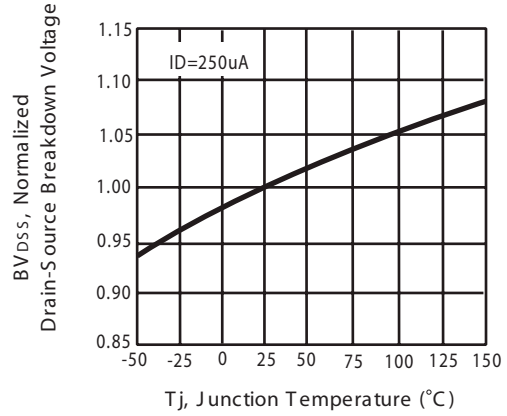


Figure 6. Breakdown Voltage Variation with Temperature

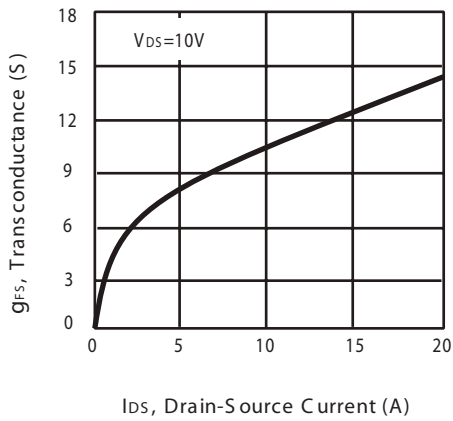


Figure 7. Transconductance Variation with Drain Current

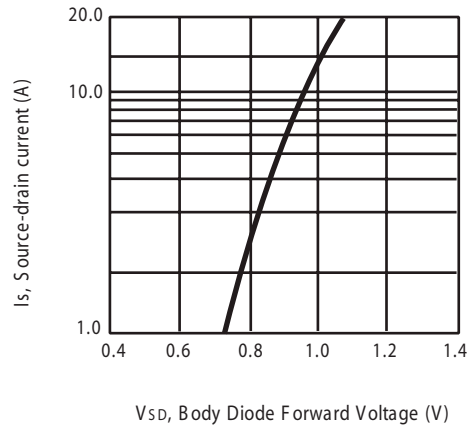


Figure 8. Body Diode Forward Voltage Variation with Source Current

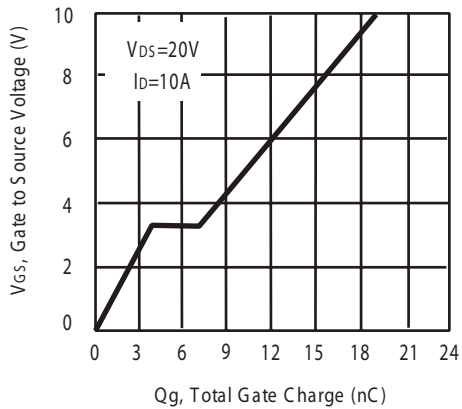


Figure 9. Gate Charge

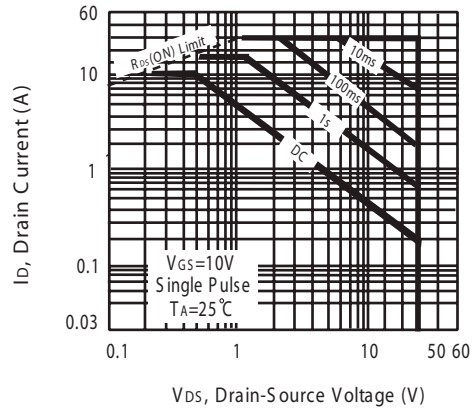


Figure 10. Maximum Safe Operating Area

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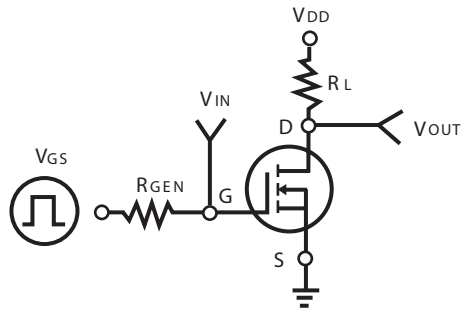


Figure 11. S switching Test Circuit

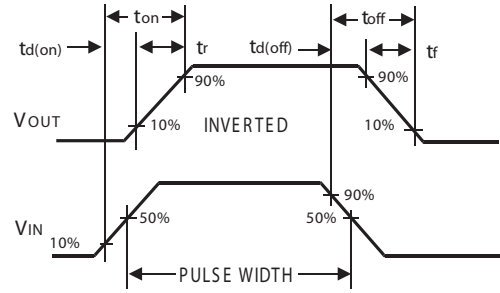
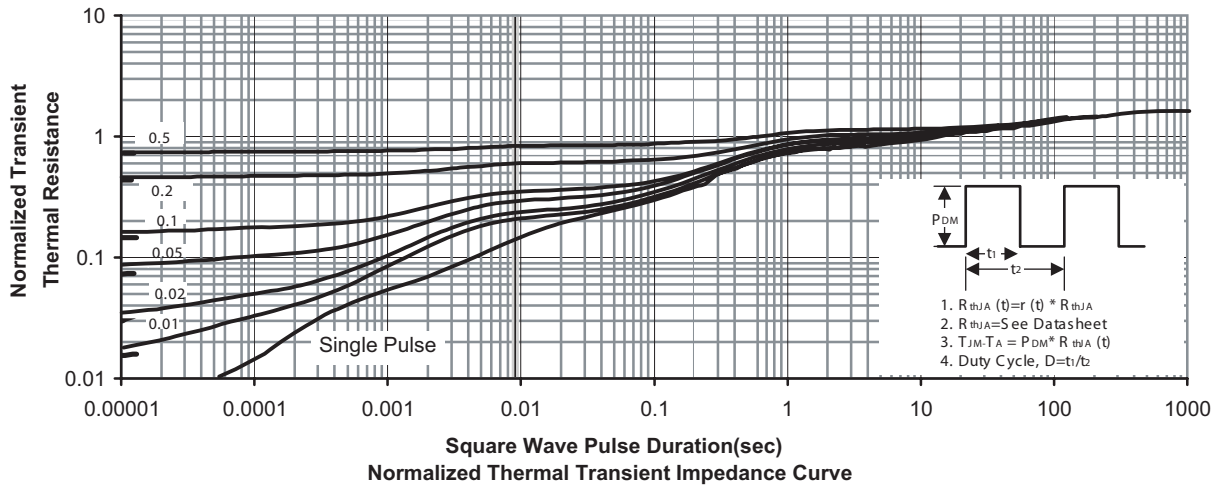


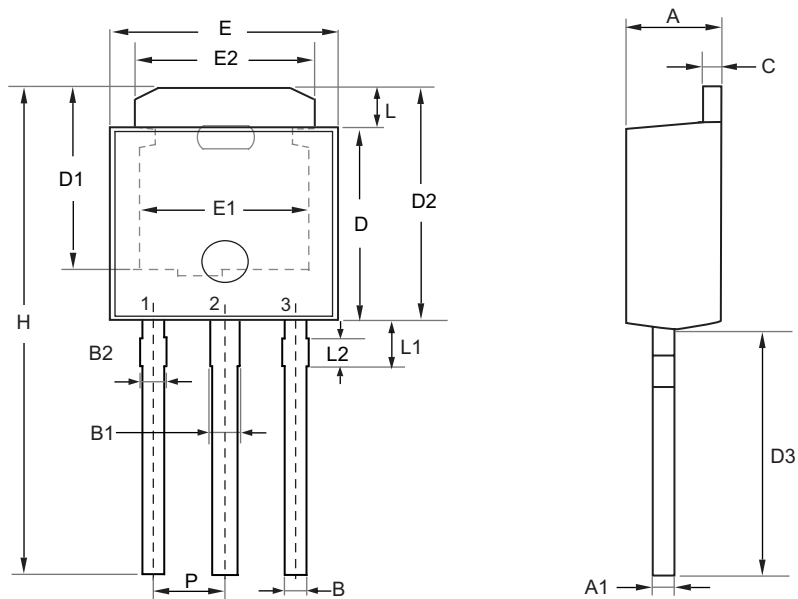
Figure 12. S switching Waveforms



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PACKAGE OUTLINE DIMENSIONS

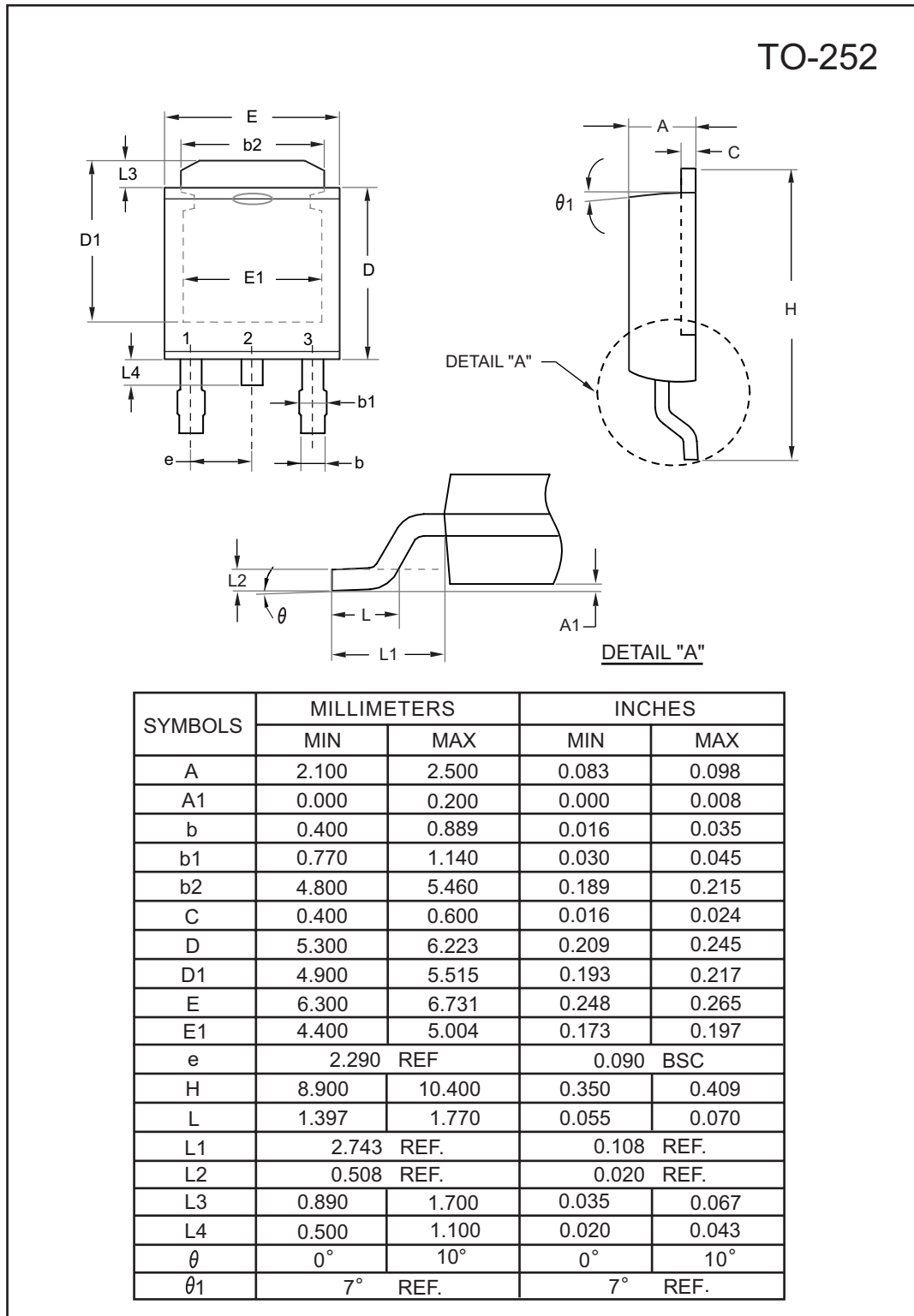
TO-251



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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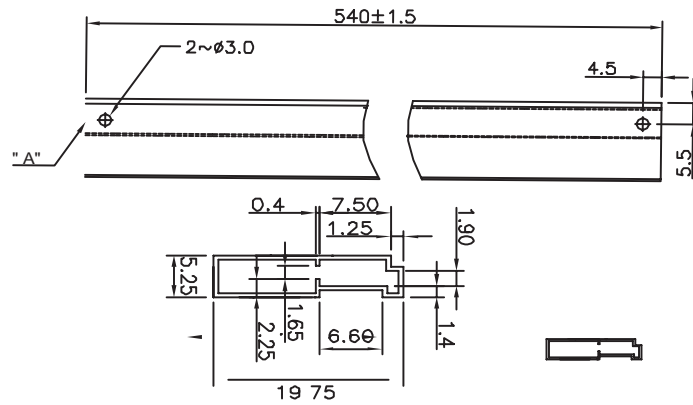
PACKAGE OUTLINE DIMENSIONS



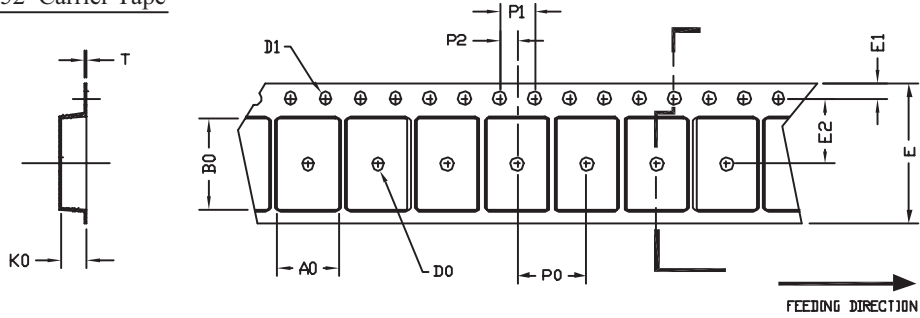
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TO251 Tube/TO-252 Tape and Reel Data

TO-251 Tube



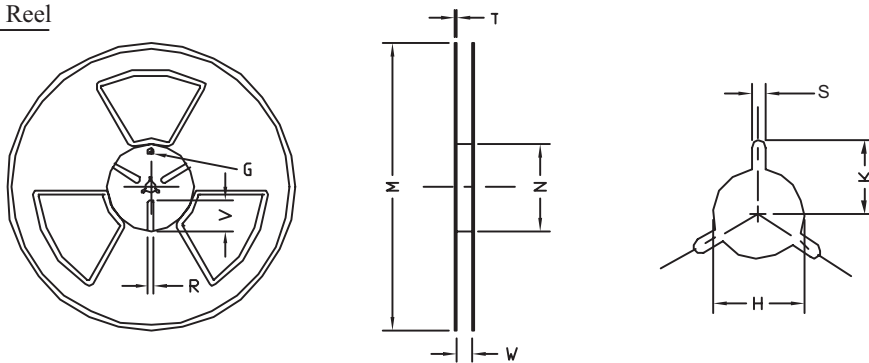
TO-252 Carrier Tape



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	φ2	φ1.5 +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	---	---	---