

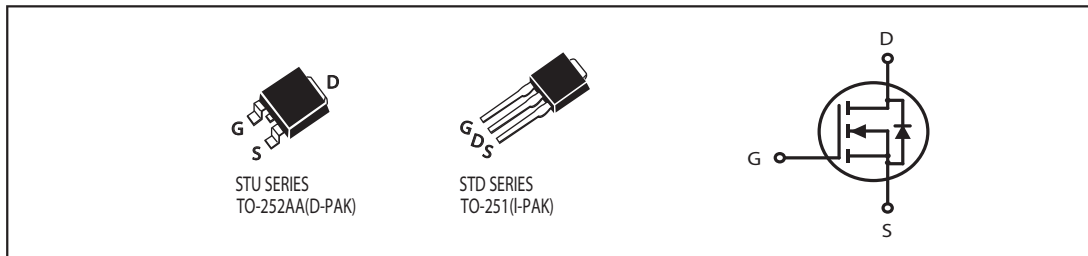


N-Channel Enhancement Mode Field Effect Transistor

PRODUCT SUMMARY		
V _{DSS}	I _D	R _{DS(ON)} (m Ω) Max
60V	22A	30 @ V _{GS} = 10V
		38 @ 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}	60	V	
Gate-Source Voltage	V _{GS}	±20	V	
Drain Current-Continuous ^a @T _a	I _D	25°C	22	A
		70°C	17	A
-Pulsed ^b	I _{DM}	60	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 θ JC	3	°C/W
Thermal Resistance, Junction-to-Ambient	R θ JA	50	°C/W

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N-Channel ELECTRICAL CHARACTERISTICS ($T_A = 25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ ^c	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	60			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 48V, V_{GS} = 0V$			1	μA
Gate-Body Leakage	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
ON CHARACTERISTICS^b						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.0	1.8	3.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 10A$		23	30	m ohm
		$V_{GS} = 4.5V, I_D = 6A$		27	38	m ohm
On-State Drain Current	$I_{D(ON)}$	$V_{DS} = 5V, V_{GS} = 10V$	30			A
Forward Transconductance	g_{FS}	$V_{DS} = 10V, I_D = 10A$		20		S
DYNAMIC CHARACTERISTICS^c						
Input Capacitance	C_{ISS}	$V_{DS} = 30V, V_{GS} = 0V$ $f = 1.0MHz$		1230		pF
Output Capacitance	C_{OSS}			125		pF
Reverse Transfer Capacitance	C_{RSS}			80		pF
Gate resistance	R_g	$V_{GS} = 0V, V_{DS} = 0V, f = 1.0MHz$		3		ohm
SWITCHING CHARACTERISTICS^c						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD} = 30V$ $I_D = 10A$ $V_{GS} = 10V$ $R_{GEN} = 3.3\text{ ohm}$		21		ns
Rise Time	t			23		ns
Turn-Off Delay Time	$t_{D(OFF)}$			50		ns
Fall Time	t			12		ns
Total Gate Charge	Q_g	$V_{DS} = 30V, I_D = 10A, V_{GS} = 10V$		24.5		nC
		$V_{DS} = 30V, I_D = 10A, V_{GS} = 4.5V$		12		nC
Gate-Source Charge	Q_{gs}	$V_{DS} = 30V, I_D = 10A$		2.8		nC
Gate-Drain Charge	Q_{gd}	$V_{GS} = 10V$		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.

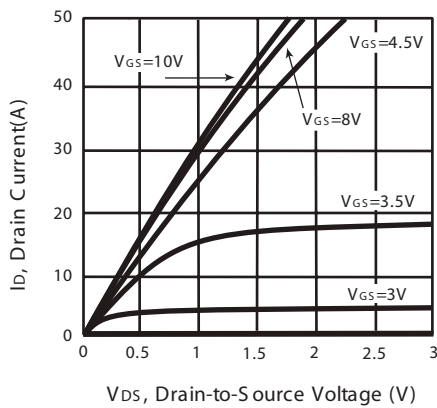


Figure 1. Output Characteristics

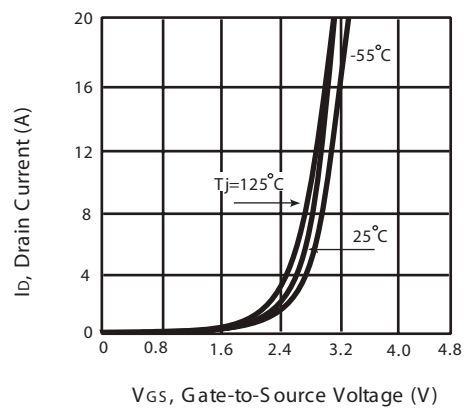


Figure 2. Transfer Characteristics

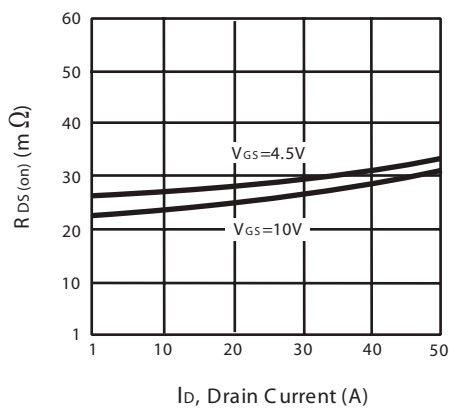


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

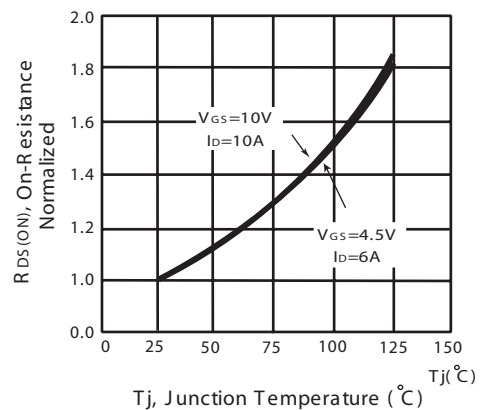


Figure 4. On-Resistance Variation with Drain Current and Temperature

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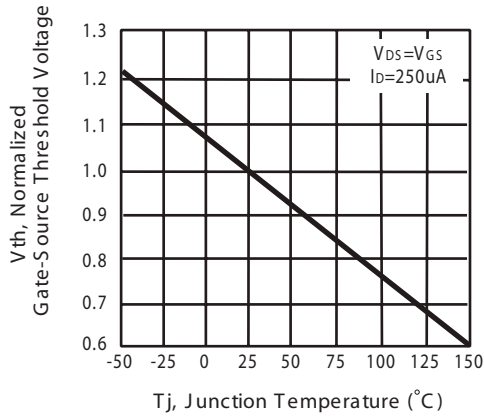


Figure 5. Gate Threshold Variation with Temperature

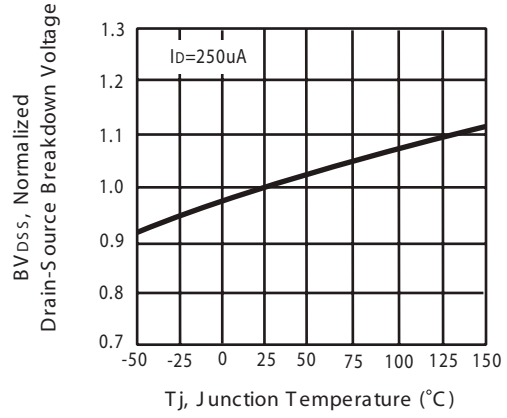


Figure 6. Breakdown Voltage Variation with Temperature

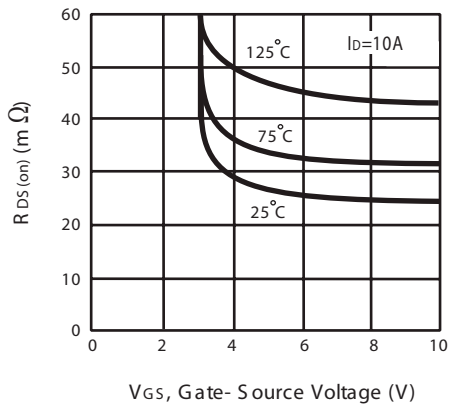


Figure 7. On-Resistance vs. Gate-Source Voltage

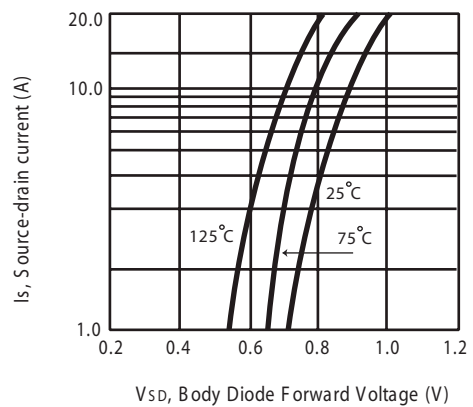


Figure 8. Body Diode Forward Voltage Variation with Source Current

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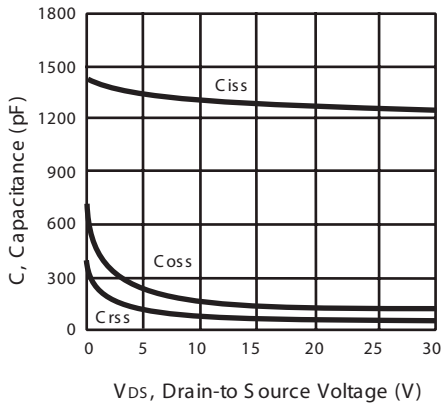


Figure 9. Capacitance

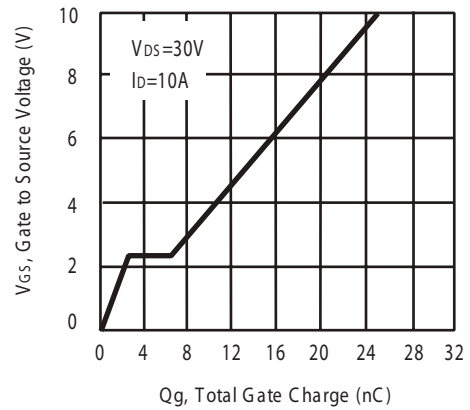


Figure 10. Gate Charge

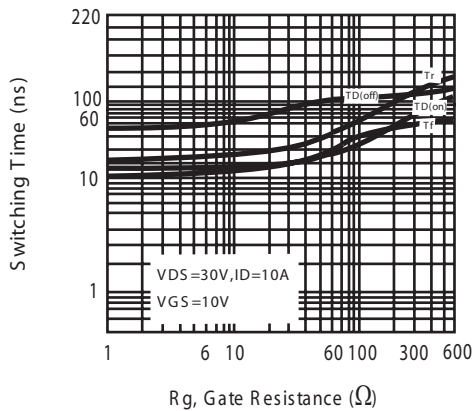


Figure 11. switching characteristics

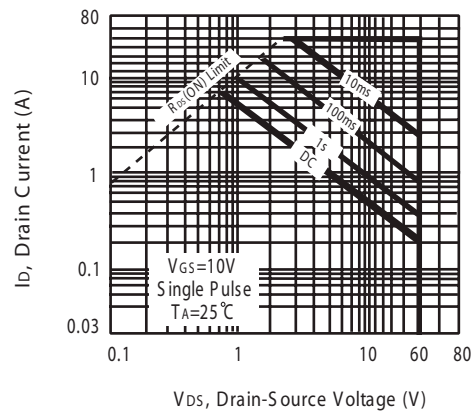


Figure 12. Maximum Safe Operating Area

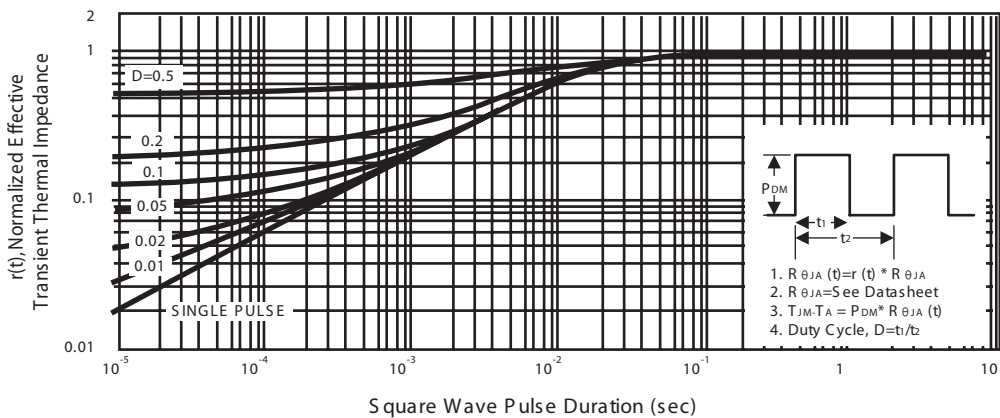
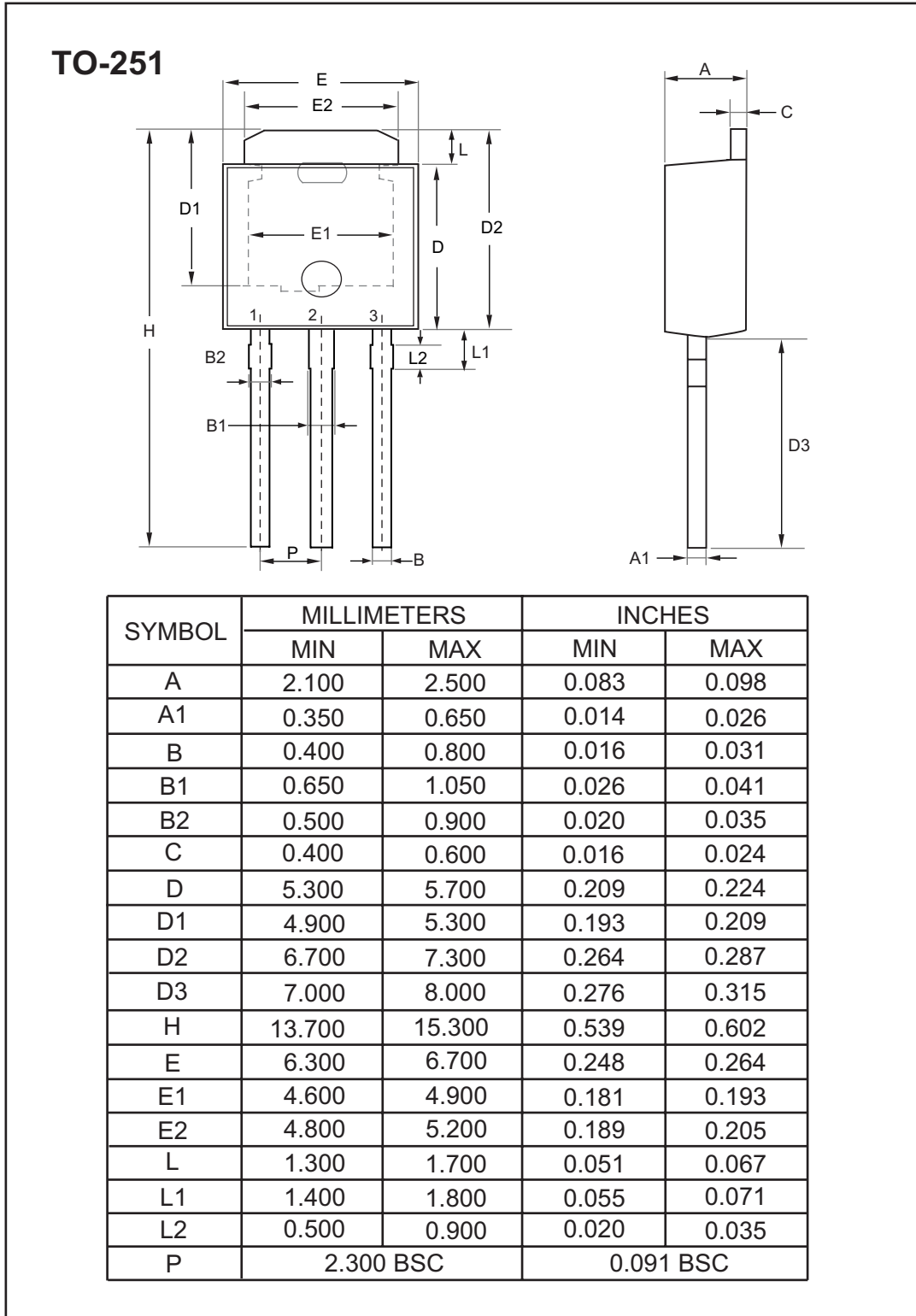


Figure 13. Normalized Thermal Transient Impedance Curve

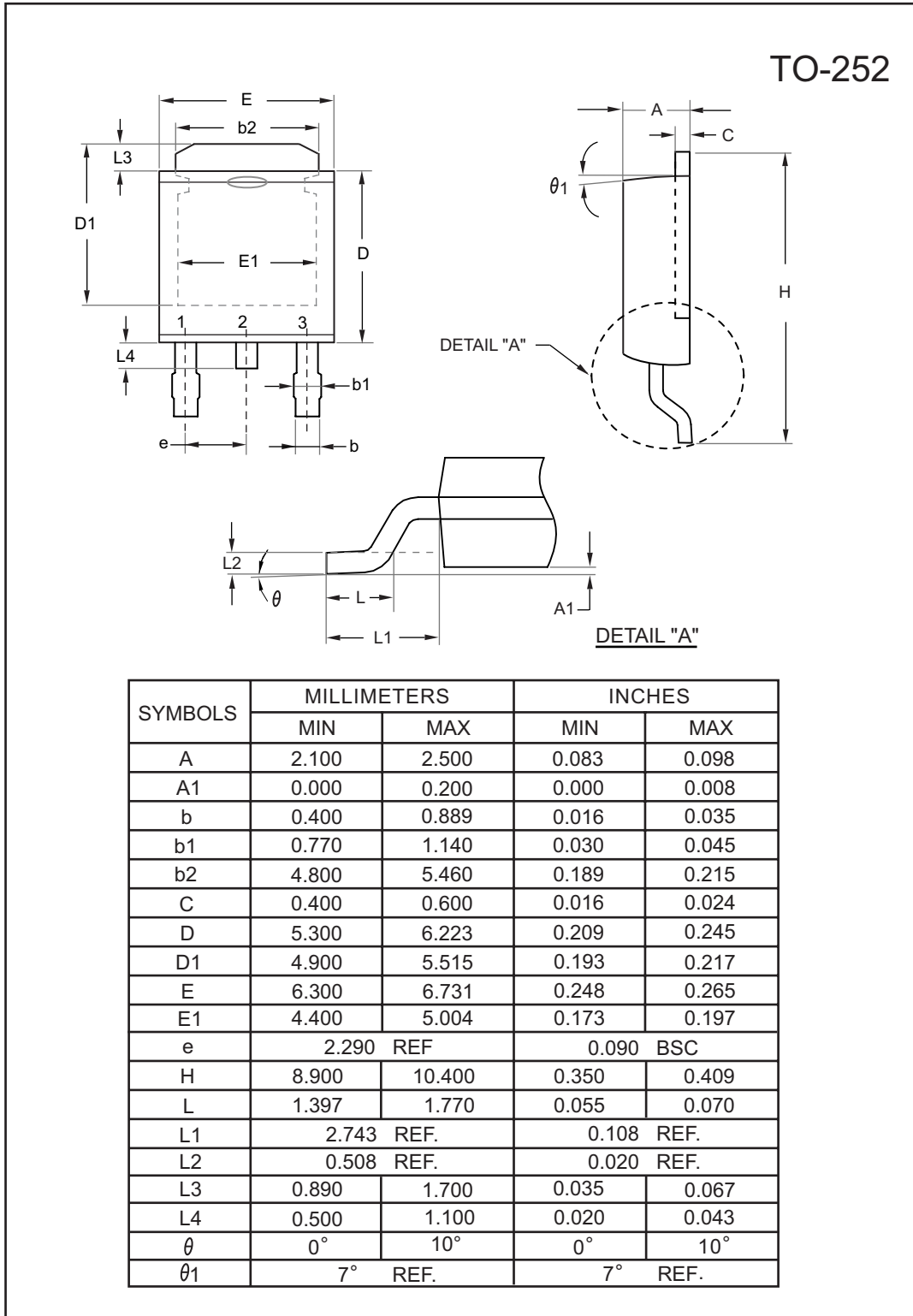
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PACKAGE OUTLINE DIMENSIONS



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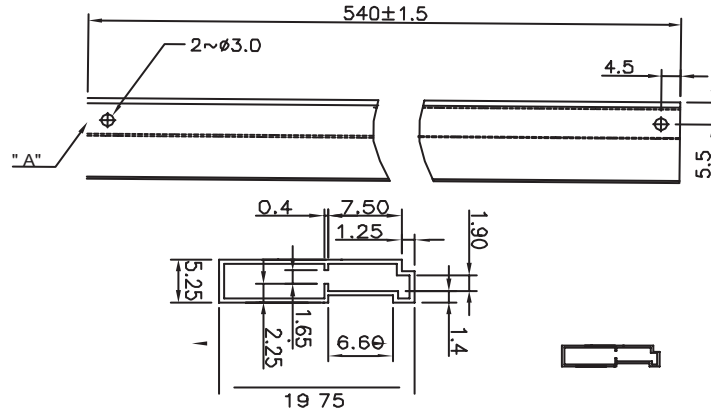
PACKAGE OUTLINE DIMENSIONS



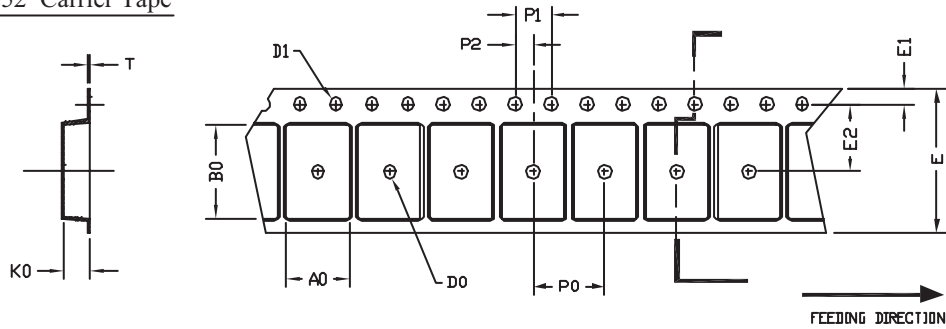
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TO251 Tube/TO-252 Tape and Reel Data

TO-251 Tube



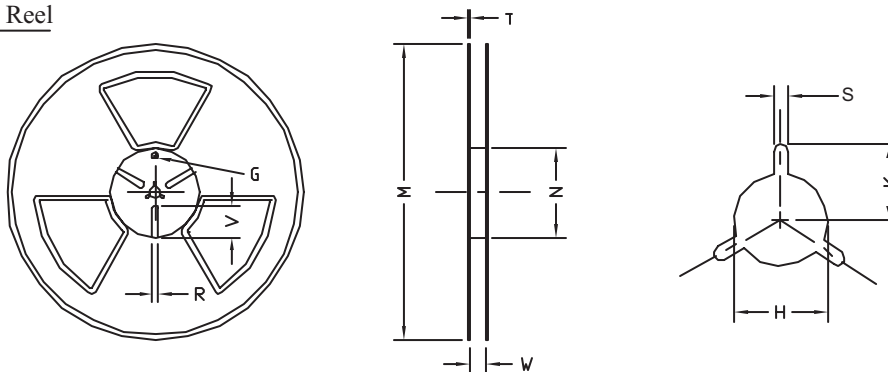
TO-252 Carrier Tape



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	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	---	---	---