

Absolute Maximum Ratings

Absolute maximum ratings indicates sustained limits beyond which damage to the device may occur. All voltage parameters are referenced to SOURCE lead. (T_{Ambient} = 25°C unless otherwise specified). PCB mounting uses the standard footprint with 70 µm copper thickness.

Symbol	Parameter	Min.	Max.	Units	Test Conditions
V _{ds}	Maximum drain to source voltage	—	47	V	
V _{in}	Maximum input voltage	-0.3	7		
I _{in, max}	Maximum IN current	-10	+10	mA	
I _{sd cont.}	Diode max. continuous current ⁽¹⁾ (r _{th} =125°C/W)	—	1.2	A	
I _{sd pulsed}	Diode max. pulsed current ⁽¹⁾	—	3		
P _d	Maximum power dissipation ⁽¹⁾ (r _{th} =125°C/W)	—	1	W	
ESD1	Electrostatic discharge voltage (Human Body)	—	4	kV	C=100pF, R=1500Ω,
ESD2	Electrostatic discharge voltage (Machine Model)	—	0.5		C=200pF, R=0Ω, L=10µH
T _{stor.}	Max. storage temperature	-55	150	°C	
T _{j max.}	Max. junction temperature	-40	150	°C	

Thermal Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
R _{th1}	Thermal resistance with standard footprint	—	100	—	°C/W	
R _{th2}	Thermal resistance with 1" square footprint	—	60	—		

Recommended Operating Conditions

These values are given for a quick design. For operation outside these conditions, please consult the application notes.

Symbol	Parameter	Min.	Max.	Units
V _{ds (max)}	Continuous drain to source voltage	—	35	V
V _{IH}	High level input voltage	4	6	
V _{IL}	Low level input voltage	0	0.5	
I _{ds} T _{amb} =85°C	Continuous drain current (T _{Ambient} = 85°C, I _N = 5V, r _{th} = 100°C/W, T _j = 125°C)	—	0.75	A
R _{in}	Recommended resistor in series with IN pin	1	5	kΩ
T _{r-in(max)}	Max recommended rise time for IN signal (see fig. 2)	—	1	µS
Fr-Isc ⁽²⁾	Max. frequency in short circuit condition (V _{cc} = 14V)	0	1	kHz

(1) Limited by junction temperature (pulsed current limited also by internal wiring)

(2) Operations at higher switching frequencies is possible. See Appl. notes.

Static Electrical Characteristics

(T_j = 25°C unless otherwise specified.)

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
R _{ds(on)}	ON state resistance T _j = 25°C T _j = 150°C	—	370 590	500 900	mΩ	V _{in} = 5V, I _{ds} = 1A
I _{dss1} @T _j =25°C	Drain to source leakage current	0	0.5	25	μA	V _{cc} = 14V, T _j = 25°C
I _{dss2} @T _j =25°C	Drain to source leakage current	0	5	50		V _{cc} = 40V, T _j = 25°C
V _{clamp 1}	Drain to Source clamp voltage 1	47	52	56	V	I _d = 20mA (see Fig.3 & 4)
V _{clamp 2}	Drain to Source clamp voltage 2	50	53	60		I _d =I _{shutdown} (see Fig.3 & 4)
V _{in clamp}	IN to Source clamp voltage	7	8.1	9.5		I _{in} = 1 mA
V _{in th}	IN threshold voltage	1	1.6	2		I _d = 50mA, V _{ds} = 14V
I _{in, -on}	ON state IN positive current	25	90	200	μA	V _{in} = 5V
I _{in, -off}	OFF state IN positive current	50	130	250		V _{in} = 5V over-current triggered

Switching Electrical Characteristics

V_{cc} = 14V, Resistive Load = 20Ω, R_{input} = 1kΩ, 100μs pulse, T_j = 25°C, (unless otherwise specified).

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
T _{on}	Turn-on delay time	0.05	0.2	0.5	μs	See figure 2
T _r	Rise time	0.5	1.3	2.5		
T _{rf}	Time to 130% final R _{ds(on)}	—	5	—		See figure 2
T _{off}	Turn-off delay time	0.5	1.6	2.5		
T _f	Fall time	0.5	1.5	2.5	nC	V _{in} = 5V
Q _{in}	Total gate charge	—	1	—		

Protection Characteristics

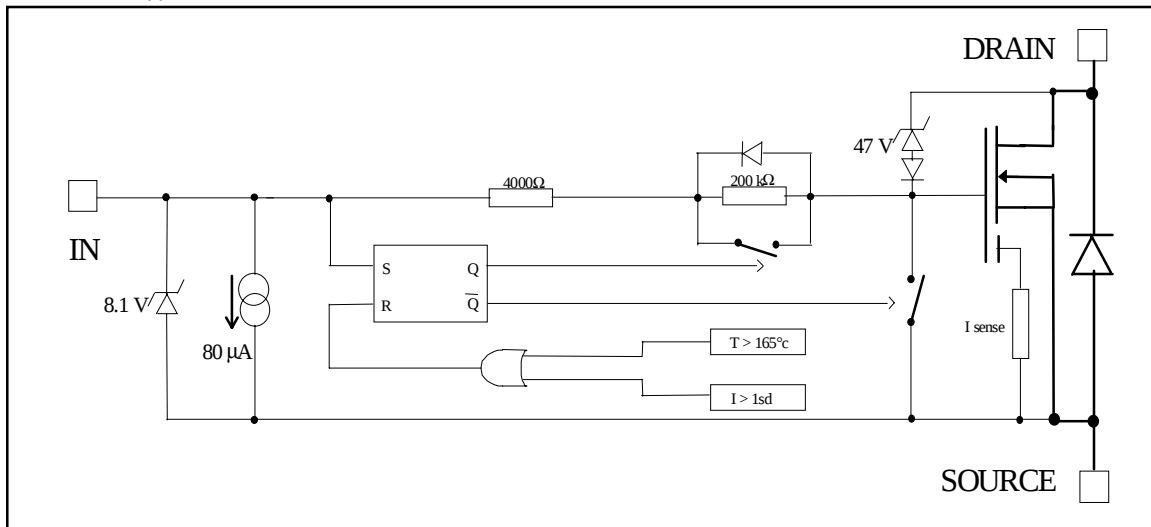
Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
T _{sd}	Over temperature threshold	—	165	—	°C	See fig. 1
I _{sd}	Over current threshold	1.1	1.7	2.2	A	See fig. 1
V _{reset}	IN protection reset threshold	1.5	2.3	3	V	
T _{reset}	Time to reset protection	2	10	40	μs	V _{in} = 0V, T _j = 25°C
EOI_OT	Short circuit energy (see application note)	—	400	—	μJ	V _{cc} = 14V

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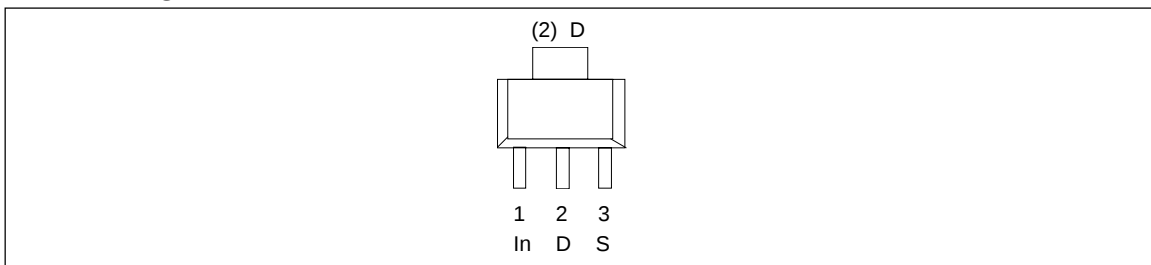
International
IR Rectifier

Functional Block Diagram

All values are typical



Lead Assignments



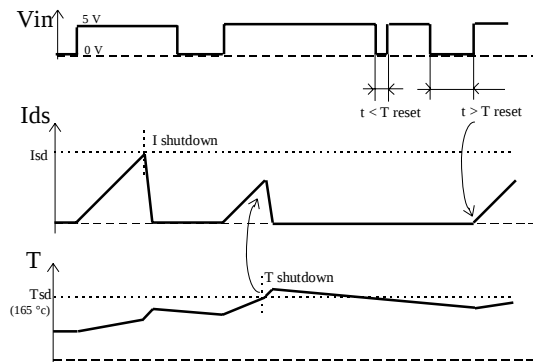


Figure 1 - Timing diagram

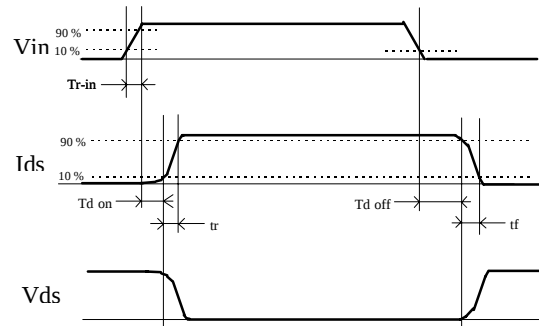


Figure 2 - IN rise time & switching time definitions

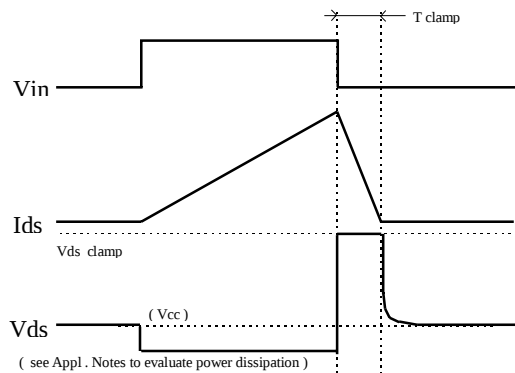


Figure 3 - Active clamp waveforms

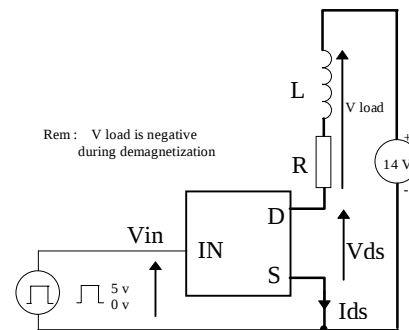


Figure 4 - Active clamp test circuit

All curves are typical values with standard footprints. Operating in the shaded area is not recommended.

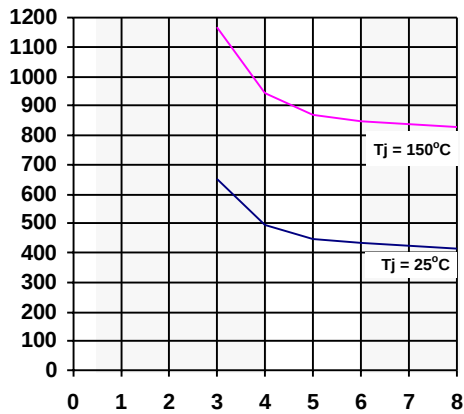


Figure 5 - Rds ON (mΩ) Vs Input Voltage (V)

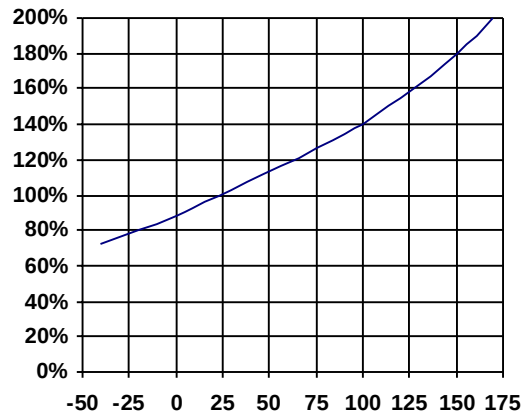


Figure 6 - Normalised Rds ON (%) Vs Tj (°C)

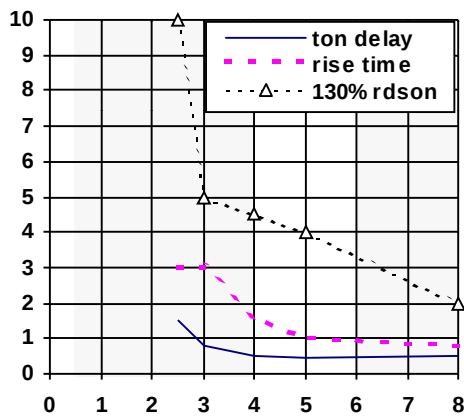


Figure 7 - Turn-ON Delay Time, Rise Time & Time to 130% final Rds(on) (us) Vs Input Voltage (V)

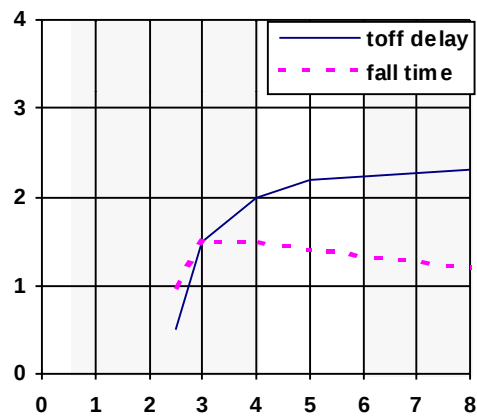


Figure 8 - Turn-OFF Delay Time & Fall Time (us) Vs Input Voltage (V)

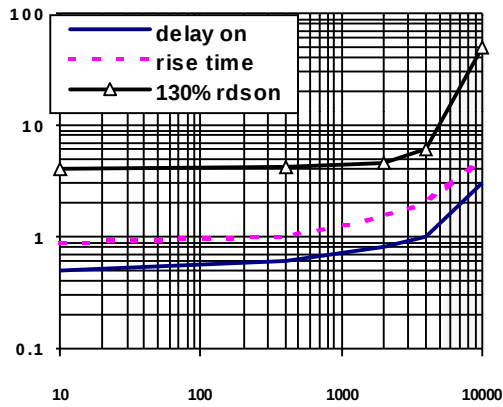


Figure 9 - Turn-ON Delay Time, Rise Time & Time to 130% final $R_{ds(on)}$ (us) Vs IN Resistor (Ω)

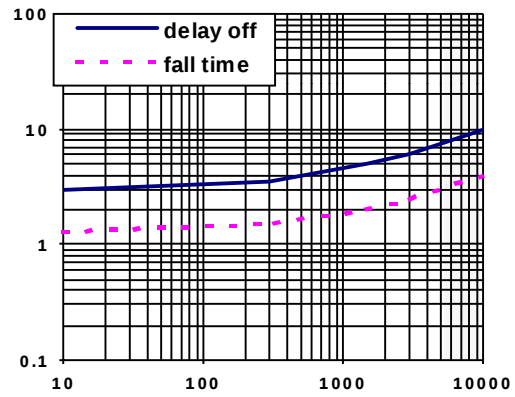


Figure 10 - Turn-OFF Delay Time & Fall Time (us) Vs IN Resistor (Ω)

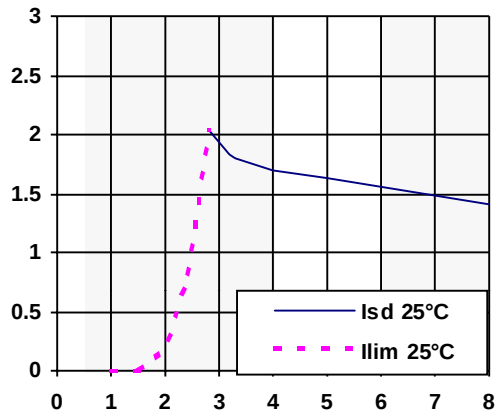


Figure 11 - Current lim. & I shutdown (A) Vs V_{in} (V)

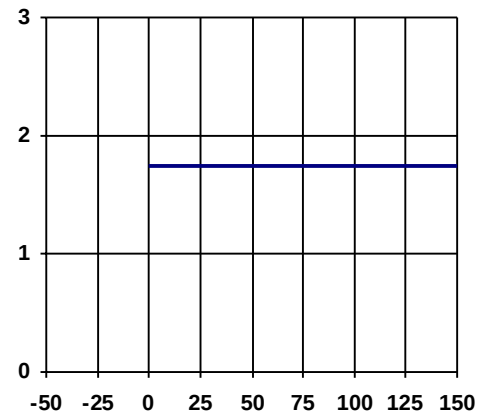


Figure 12 - I shutdown (A) Vs Temperature ($^{\circ}\text{C}$)

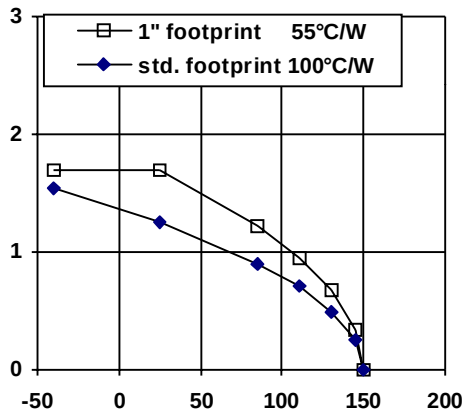


Figure 13 - Max.Cont. Ids (A) Vs Amb. Temperature (°C)

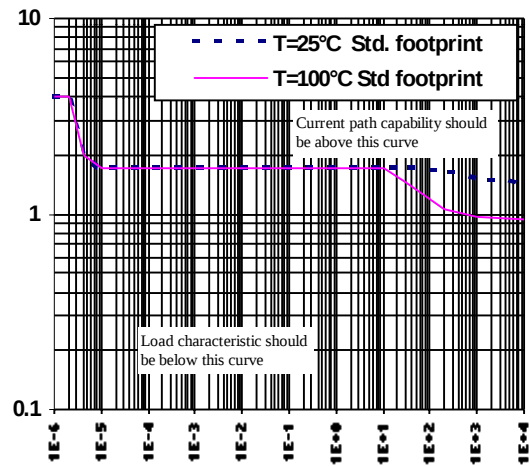


Figure 14 - Ids (A) Vs Protection Resp. Time (s)

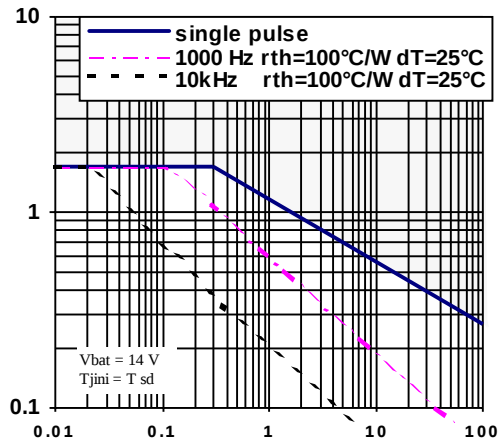


Figure 15 - Iclamp (A) Vs Inductive Load (mH)

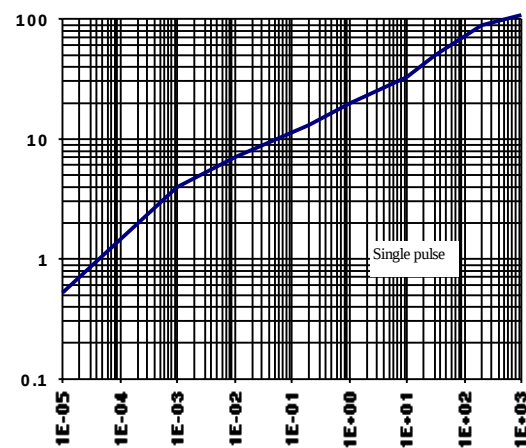


Figure 16 - Transient Thermal Imped. (°C/W) Vs Time (s)

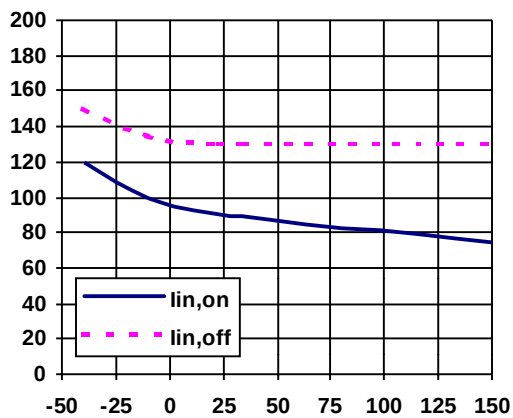


Figure 17 - Input current (μA) Vs T_j ($^{\circ}\text{C}$)

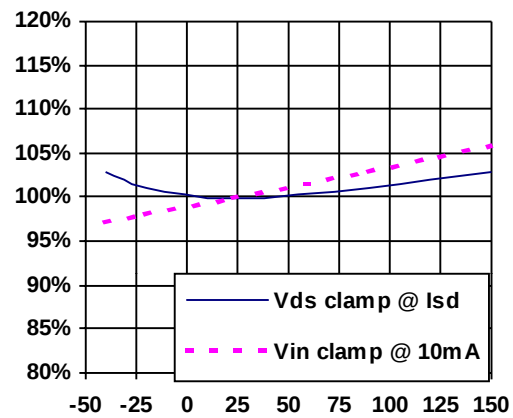


Figure 18 - Vin clamp and V clamp2 (%) Vs T_j ($^{\circ}\text{C}$)

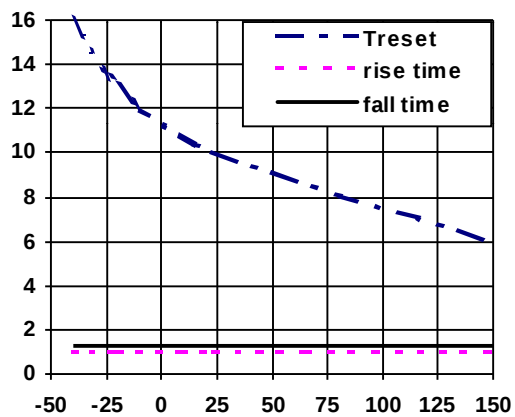
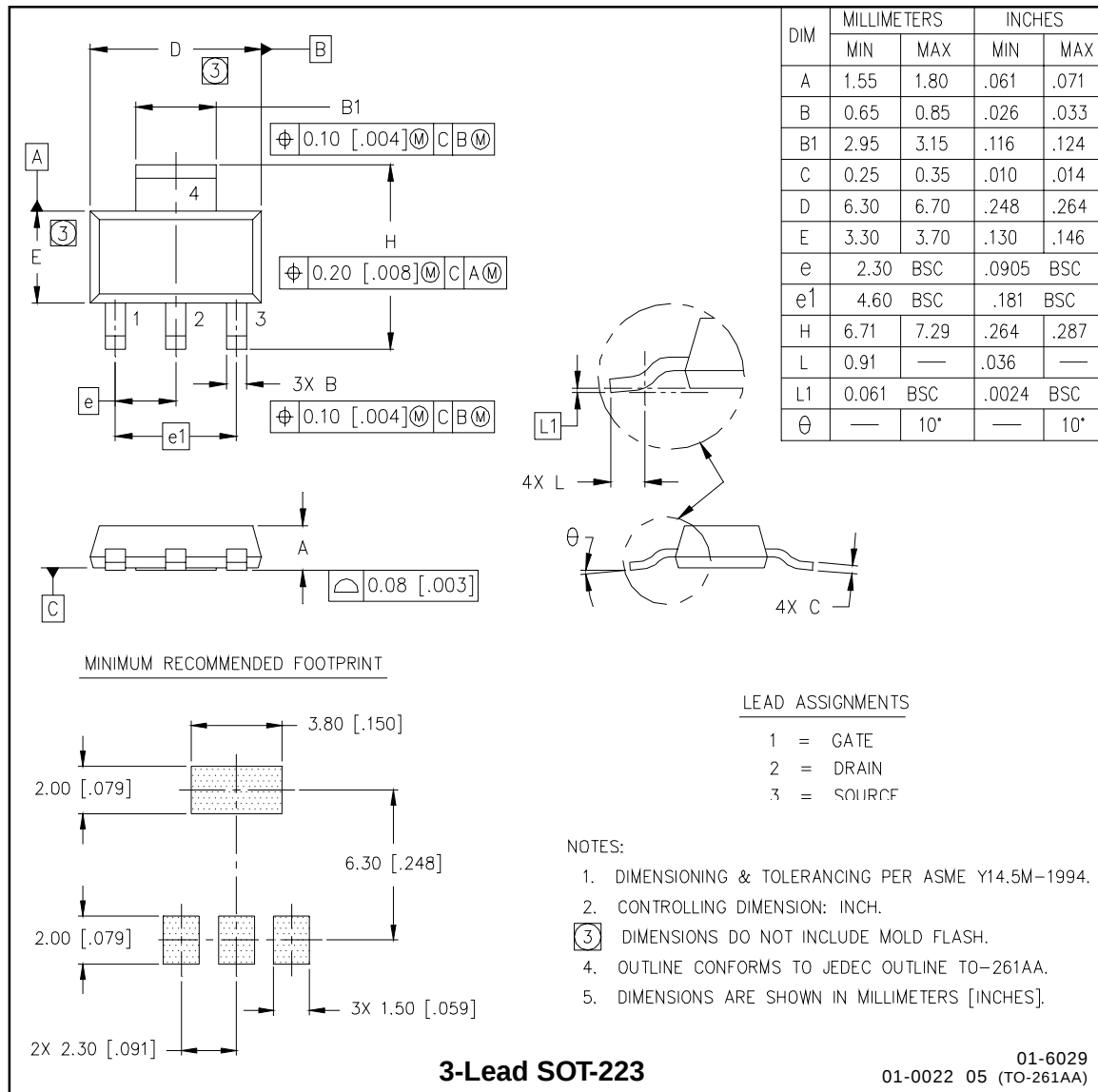


Figure 19 - Turn-on, Turn-off, and Treset (μs) Vs T_j ($^{\circ}\text{C}$)

Case Outline



Tape & Reel - SOT223

