

Product Summary

BV_{DSS}	$R_{DS(on) \max}$	$I_D \max$ $T_A = +25^\circ C$ (Note 4)
-40V	25m Ω @ $V_{GS} = -10V$	-8.6A
	45m Ω @ $V_{GS} = -4.5V$	-7.0A

Description

This MOSFET has been designed to minimize the on-state resistance and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

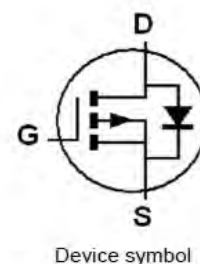
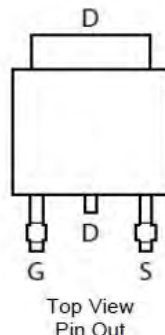
- Motor control
- Backlighting
- DC-DC Converters
- Printer equipment

Features

- Low On-Resistance
- Fast Switching Speed
- Low Input/Output Leakage
- Lead-Free Finish; RoHS compliant (Note 1)
- Halogen and Antimony Free. “Green” Device (Note 2)
- Qualified to AEC-Q101 Standards for High Reliability

Mechanical Data

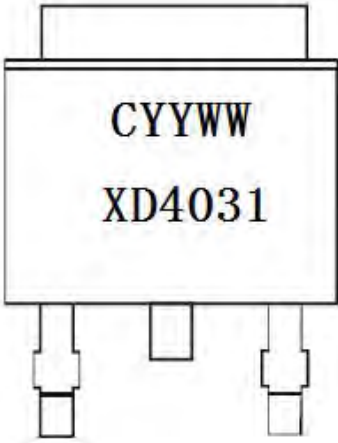
- Case: TO252 (DPAK)
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See diagram below
- Terminals: Finish - Matte Tin annealed over Copper lead frame.
- Solderable per MIL-STD-202, Method 208e³
- Weight: 0.315 grams (approximate)



Ordering Information

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
LMXD4031	XD4031	13	16	2,500

Marking Information

	<p>C = Manufacturer's Marking XD4031 = Product Type Marking Code YYWW = Date Code Marking YY = Year (ex: 10 = 2010) WW = Week (01 - 53)</p>
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Maximum Ratings (@TA = +25°C unless otherwise specified.)

Characteristic			Symbol	Value	Units	
Drain-Source Voltage			V_{DSS}	-40	V	
Gate-Source Voltage			V_{GSS}	± 20		
Continuous Drain Current	$V_{GS} = -10V$	(Notes 4)	I_D	-8.6	A	
		$T_A = +70^\circ C$ (Notes 4)		-6.9		
		(Notes 3)		-6.7		
Pulsed Drain Current	$V_{GS} = -10V$	(Notes 5)	I_{DM}	-35		
Continuous Source Current (Body diode)			(Notes 5)	I_S		-8.6
Pulsed Source Current (Body diode)			(Notes 5)	I_{SM}		-35

Thermal Characteristics (@TA = +25°C unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Power Dissipation	(Notes 3)	P_D	1.7	W
	(Notes 4)		2.78	
Thermal Resistance, Junction to Ambient	(Notes 3)	$R_{\theta JA}$	74	$^\circ C/W$
	(Notes 4)		45	
Thermal Resistance, Junction to Case		$R_{\theta JC}$	7.1	
Thermal Resistance, Junction to Lead		$R_{\theta JL}$	1.43	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	

Thermal Characteristics

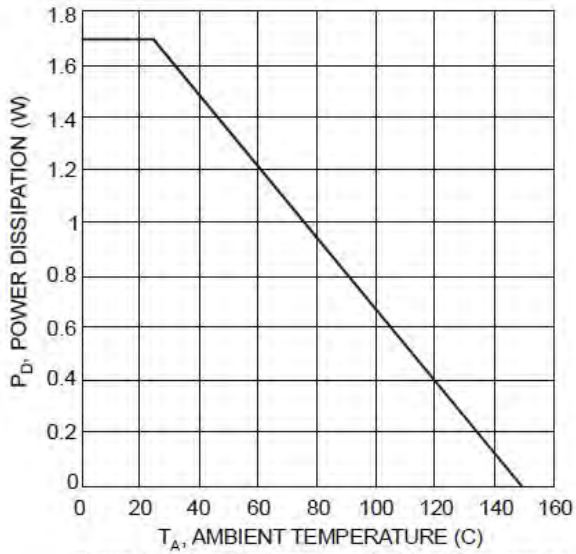


Figure 1. Power Dissipation vs. Ambient Temperature

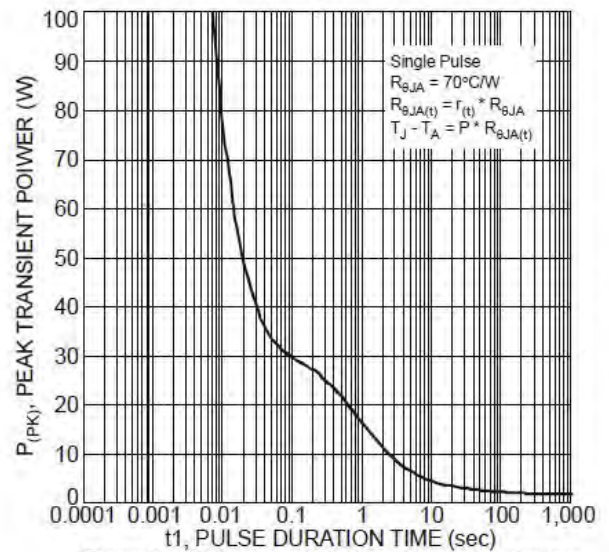


Figure 2. Single Pulse Maximum Power Dissipation

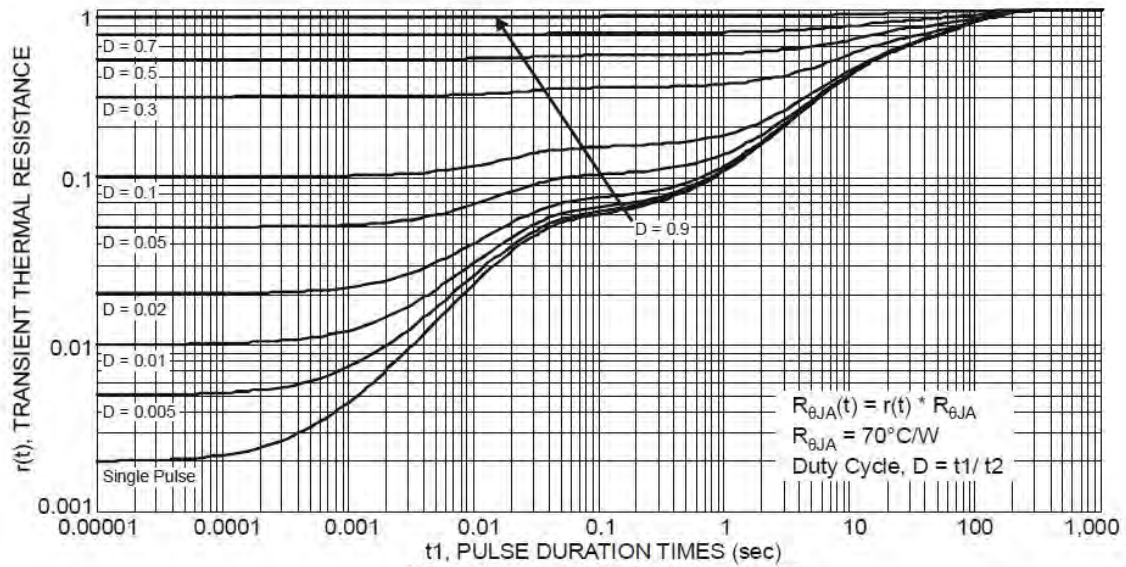


Figure 3. Transient Thermal Resistance

Electrical Characteristics (@TA = +25°C unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	-40	—	—	V	$I_D = -250\mu A, V_{GS} = 0V$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	μA	$V_{DS} = -40V, V_{GS} = 0V$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	-0.8	-1.3	-1.8	V	$I_D = -250\mu A, V_{DS} = V_{GS}$
Static Drain-Source On-Resistance (Note 7)	$R_{DS(on)}$	—	18	25	m Ω	$V_{GS} = -10V, I_D = -3A$
			30	45		$V_{GS} = -4.5V, I_D = -3A$
Forward Transconductance (Notes 7 & 8)	g_{fs}	—	16.6	—	S	$V_{DS} = -5V, I_D = -3A$
Diode Forward Voltage (Note 7)	V_{SD}	—	-0.7	-1	V	$I_S = -1A, V_{GS} = 0V$
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	1643	—	pF	$V_{DS} = -20V, V_{GS} = 0V$ $f = 1MHz$
Output Capacitance	C_{oss}	—	179	—		
Reverse Transfer Capacitance	C_{rss}	—	128	—		
Gate Resistance	R_g	—	6.43	—	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$
Total Gate Charge (Note 9)	Q_g	—	14	—	nC	$V_{DS} = -20V$ $I_D = -3A$
Total Gate Charge (Note 9)	Q_g	—	33.7	—		
Gate-Source Charge (Note 9)	Q_{gs}	—	5.5	—		
Gate-Drain Charge (Note 9)	Q_{gd}	—	7.3	—		
Turn-On Delay Time (Note 9)	$t_{D(on)}$	—	6.9	—	ns	$V_{DD} = -20V, V_{GS} = -10V$ $I_D = -3A$
Turn-On Rise Time (Note 9)	t_r	—	14.7	—		
Turn-Off Delay Time (Note 9)	$t_{D(off)}$	—	53.7	—		
Turn-Off Fall Time (Note 9)	t_f	—	30.9	—		

Notes:

- EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
- Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
- For a device surface mounted on minimum recommended FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
- Same as note (5), except the device is surface mounted on 25mm X 25mm X 1.6mm FR4 PCB.
- Repetitive rating on 25mm X 25mm FR4 PCB, D=0.02, pulse width 300 μs – pulse width by maximum junction temperature.
- Thermal resistance from junction to solder-point (at the end of the drain lead).
- Measured under pulsed conditions. Pulse width 300 μs ; duty cycle 2%.
- For design aid only, not subject to production testing.
- Switching characteristics are independent of operating junction temperatures.

Typical Characteristics

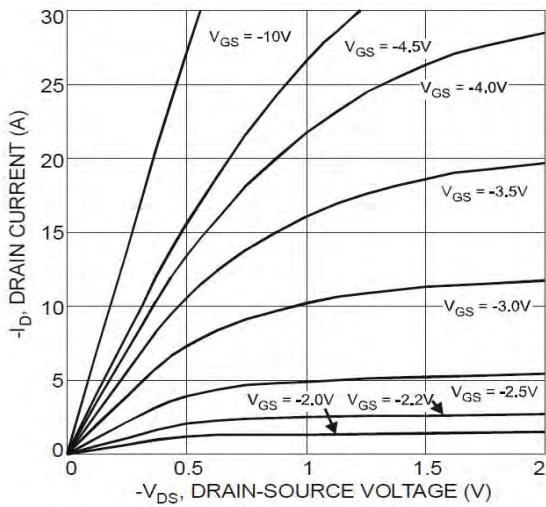


Figure 4. Typical Output Characteristic

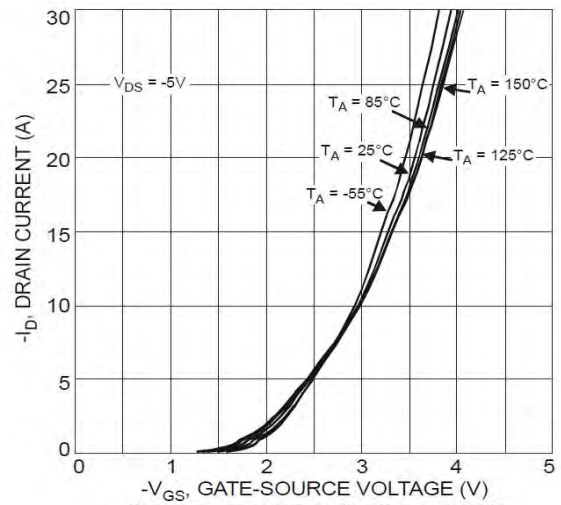


Figure 5. Typical Transfer Characteristic

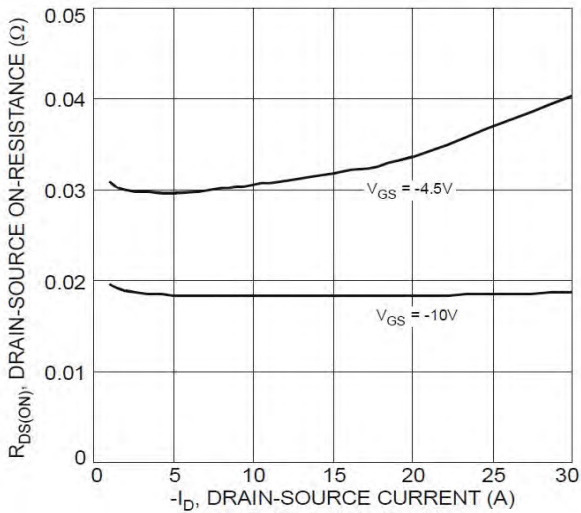


Figure 6. Typical On-Resistance vs. Drain Current and Gate Voltage

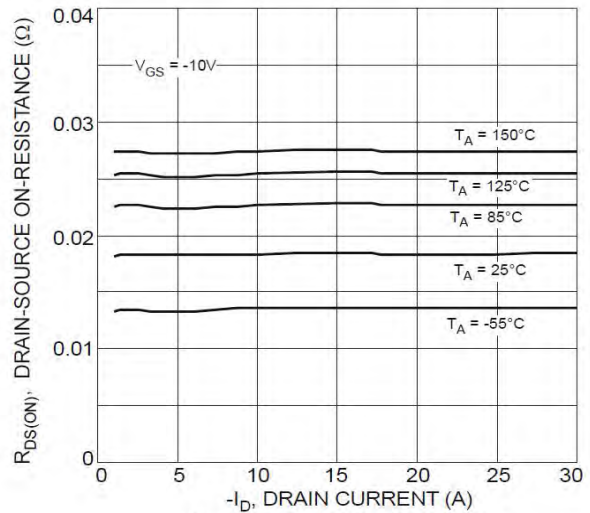


Figure 7. Typical On-Resistance vs. Drain Current and Temperature

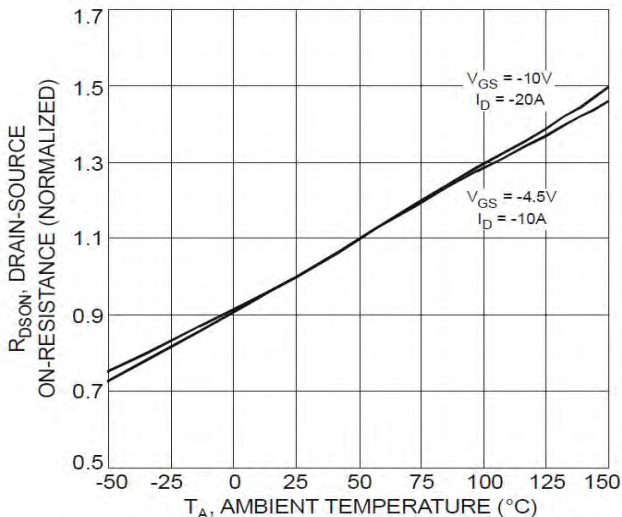


Figure 8. On-Resistance Variation with Temperature

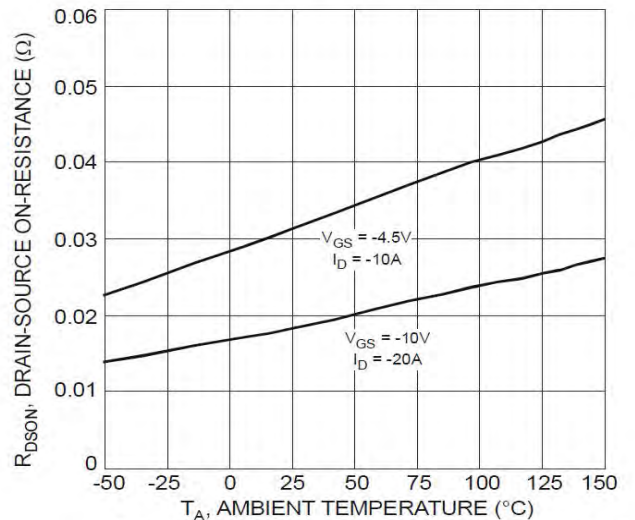


Figure 9. On-Resistance Variation with Temperature

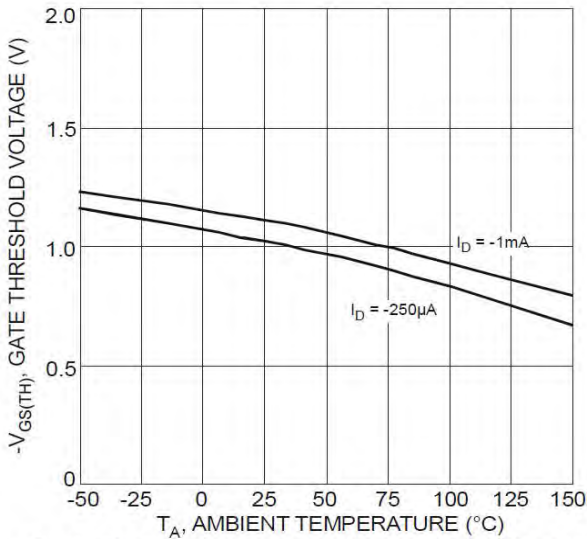


Figure 10. Gate Threshold Variation vs. Ambient Temperature

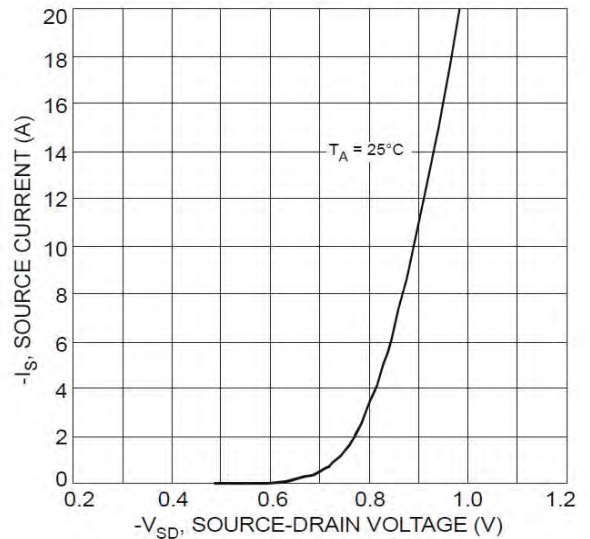


Figure 11. Diode Forward Voltage vs. Current

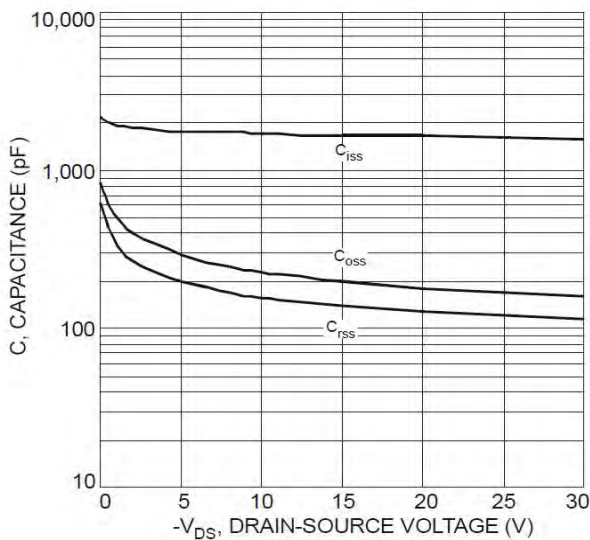


Figure 12. Typical Total Capacitance

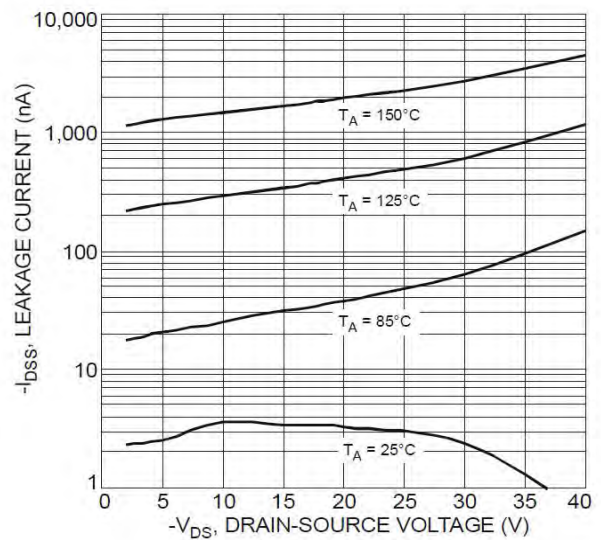


Figure 13. Typical Leakage Current vs. Drain-Source Voltage

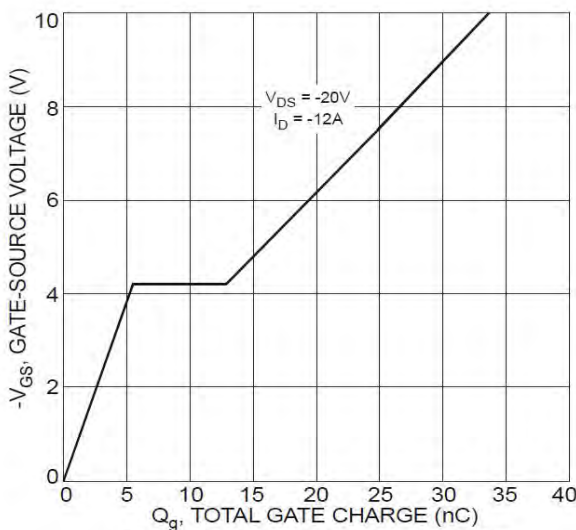


Figure 14. Gate-Charge Characteristics

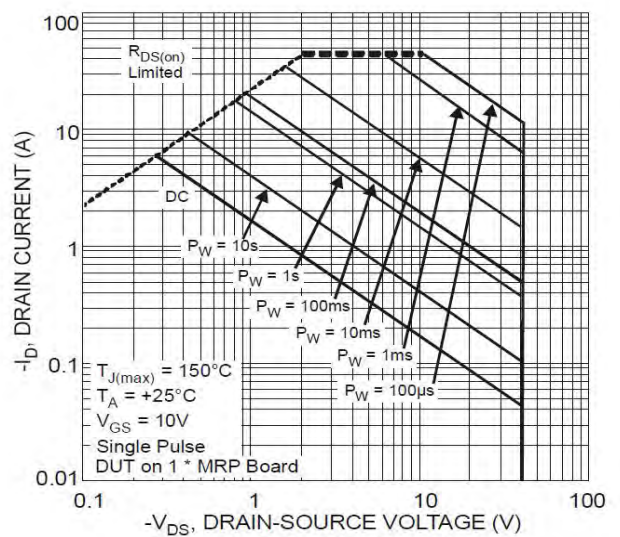
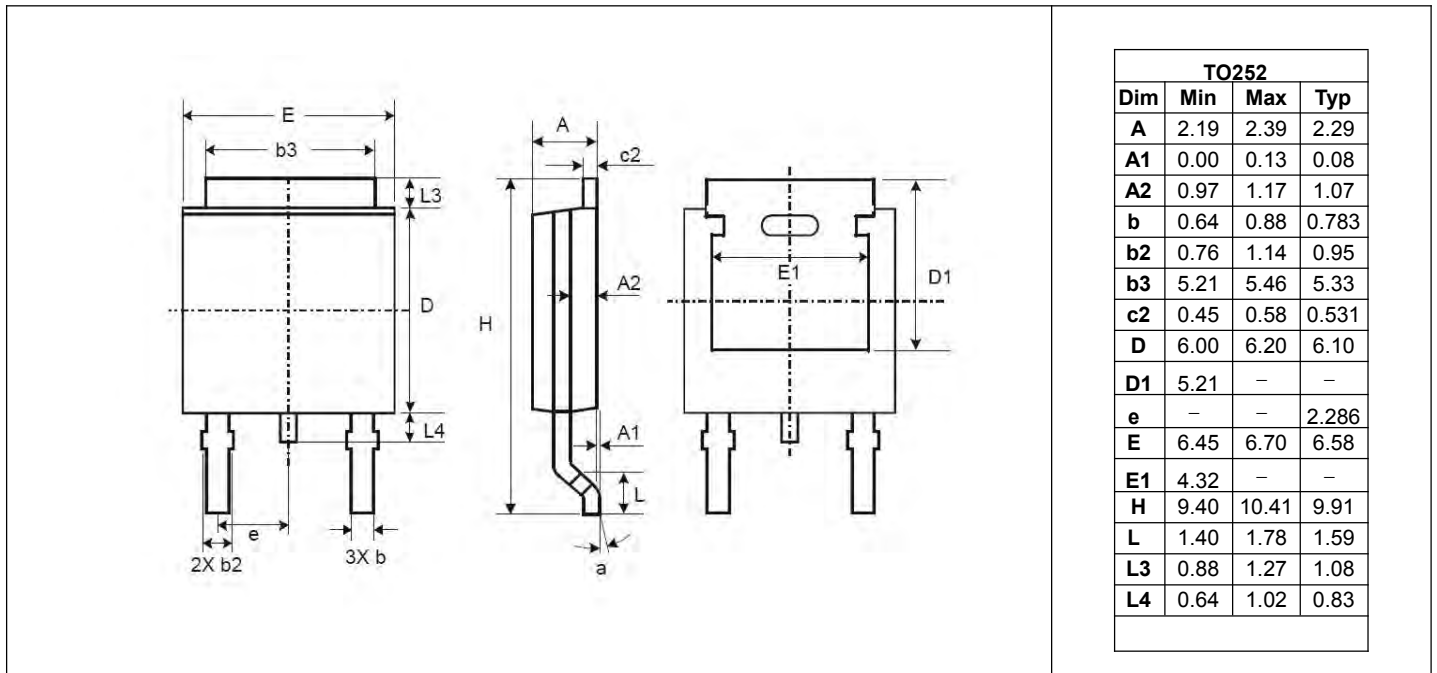
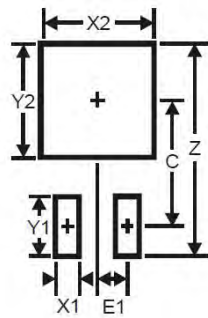


Figure 15. SOA, Safe Operation Area

Package Outline Dimensions



Suggested Pad Layout



Dimensions	Value (in mm)
Z	11.6
X1	1.5
X2	7.0
Y1	2.5
Y2	7.0
C	6.9
E1	2.3