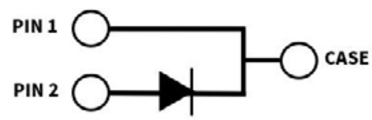
C4D02120E

1200 V, 2 A Silicon Carbide Schottky Diode

TO-252-2



Package Types: TO-252-2
PN: C4D02120

Features

- 1.2 kV Schottky rectifier
- Zero reverse recovery current
- High-frequency operation
- Temperature-independent switching
- Extremely fast switching
- Positive temperature coefficient on V_F

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Applications

- Switch mode power supplies (SMPS)
- Boost diodes in PFC or DC/DC stages
- Free wheeling diodes in inverter stages
- LED lighting power supplies
- AC/DC converters

Benefits

- Replace bipolar with unipolar rectifiers
- Essentially no switching losses
- Higher efficiency
- Reduction of heat sink requirements
- Parallel devices without thermal runaway

Maximum Ratings (T_C = 25 °C Unless Otherwise Specified)

Parameter	Symbol	Value	Unit	Test Conditions	Note
Repetitive Peak Reverse Voltage	V_{RRM}	1200	V		
Surge Peak Reverse Voltage	V_{RSM}	1300			
DC Blocking Voltage	V_{DC}	1200			
Maximum DC Current	I_F	10	A	T_C = 25 °C	Fig. 3
		5		T_C = 135 °C	
		2		T_C = 165 °C	
Repetitive Peak Forward Surge Current	I_{FRM}	13		T_C = 25 °C, t_P = 10 ms, Half Sine Pulse	
		8.4		T_C = 110 °C, t_P = 10 ms, Half Sine Pulse	
Non-Repetitive Peak Forward Surge Current	I_{FSM}	19		T_C = 25 °C, t_P = 10 ms, Half Sine Pulse	Fig. 8
		16.5		T_C = 110 °C, t_P = 10 ms, Half Sine Pulse	
Non-Repetitive Peak Forward Current	$I_{F,\,Max}$	200		T_C = 25 °C, t_P = 10 µs, Pulse	Fig. 8
		160		T_C = 110 °C, t_P = 10 µs, Pulse	
Power Dissipation	P_{tot}	60	W	T_C = 25 °C	Fig. 4
		26		T_C = 110 °C	
Diode dV/dt Ruggedness	dV/dt	200	V/ns	V_R = 0-650 V	
i^2t Value	$\int i^2dt$	1.8	A^2s	T_C = 25 °C, t_P = 10 ms	
		1.4		T_C = 110 °C, t_P = 10 ms	
Operating Junction and Storage Temperature	T_J, T_{stg}	-55 to +175	°C		

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Electrical Characteristics

Parameter	Symbol	Typ.	Max.	Unit	Test Conditions	Note
Forward Voltage	V_F	1.4	1.8	V	I_F = 2 A, T_J = 25 °C	Fig. 1
		1.9	3		I_F = 2 A, T_J = 175 °C	
Reverse Current	I_R	10	50	µA	V_R = 1200 V, T_J = 25 °C	Fig. 2
		40	150		V_R = 1200 V, T_J = 175 °C	
Total Capacitive Charge	Q_C	11		nC	V_R = 800 V, I_F = 2 A di/dt = 200 A/µS T_J = 25 °C	Fig. 5
Total Capacitance	C	167		pF	V_R = 0 V, T_J = 25 °C, f = 1 MHz	Fig. 6
		11			V_R = 400 V, T_J = 25 °C, f = 1 MHz	
		8			V_R = 800 V, T_J = 25 °C, f = 1 MHz	
Capacitance Stored Energy	E_C	3.2		µJ	V_R = 800 V	Fig. 7

Note: This is a majority carrier diode, so there is no reverse recovery charge.

Thermal Characteristics

Parameter	Symbol	Typ.	Unit	Note
Thermal Resistance from Junction to Case	$R_{\theta JC}$	2.5	°C/W	Fig. 9

Typical Performance

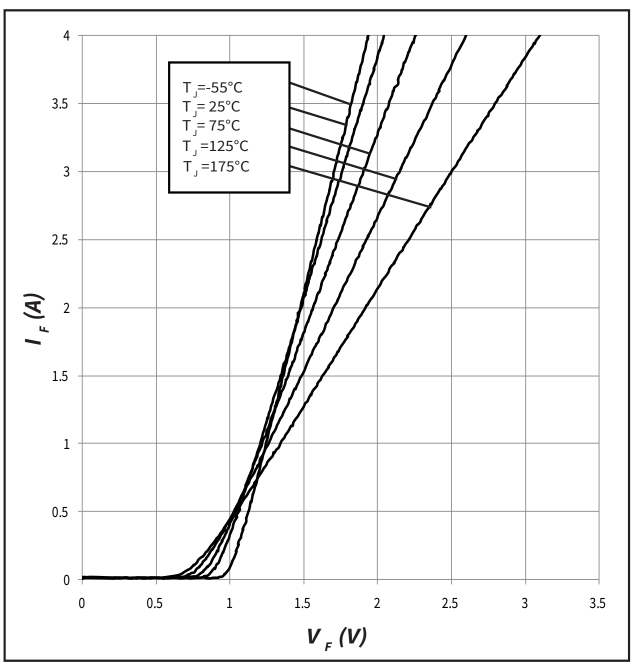


Figure 1. Forward Characteristics

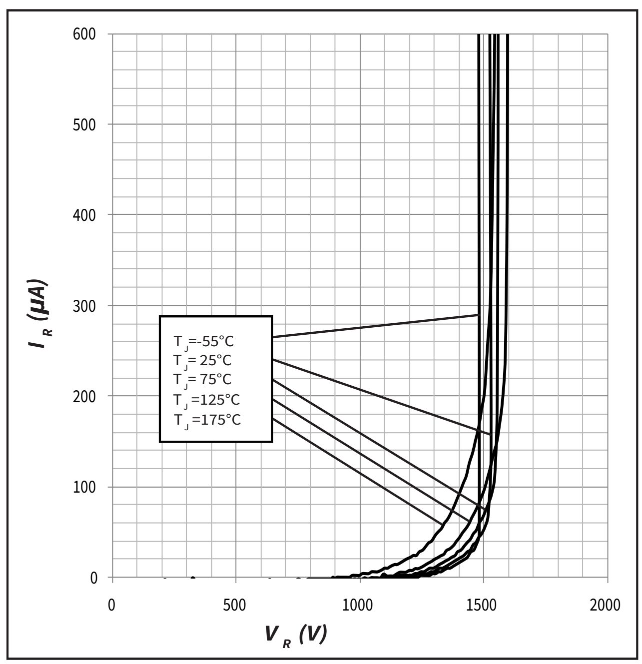


Figure 2. Reverse Characteristics

Typical Performance

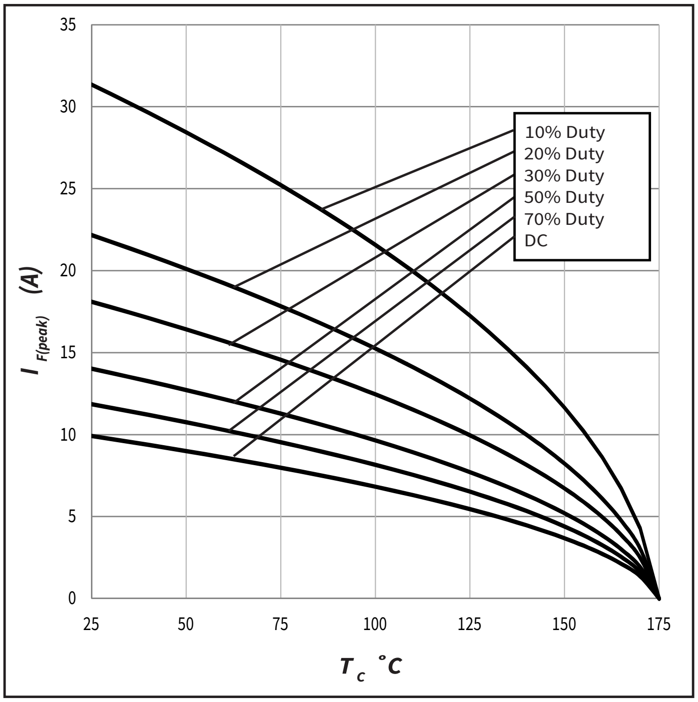


Figure 3. Current Derating

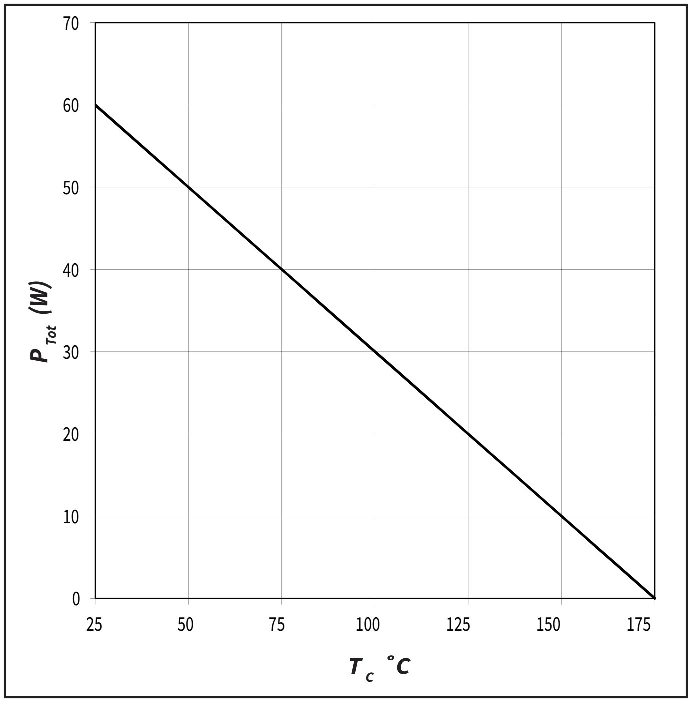


Figure 4. Power Derating

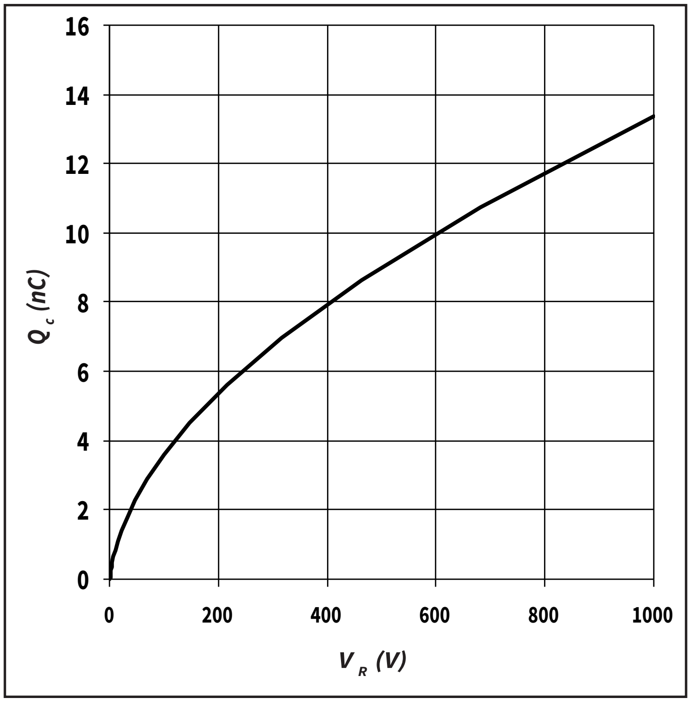


Figure 5. Recovery Charge vs. Reverse Voltage

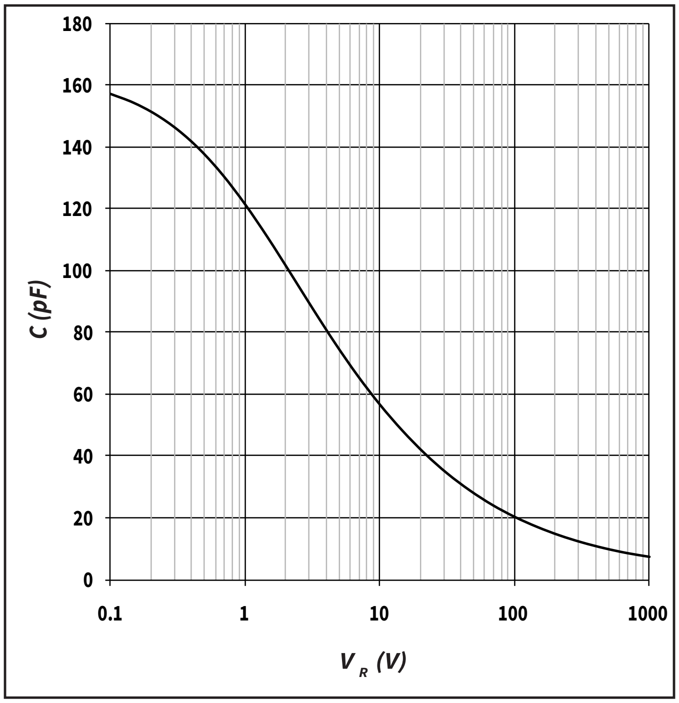


Figure 6. Capacitance vs. Reverse Voltage

Typical Performance

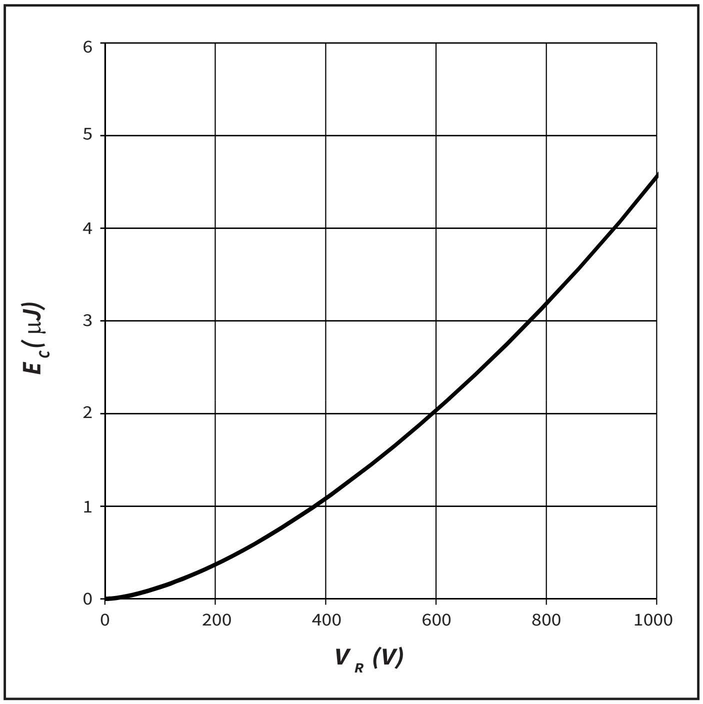


Figure 7. Typical Capacitance Stored Energy

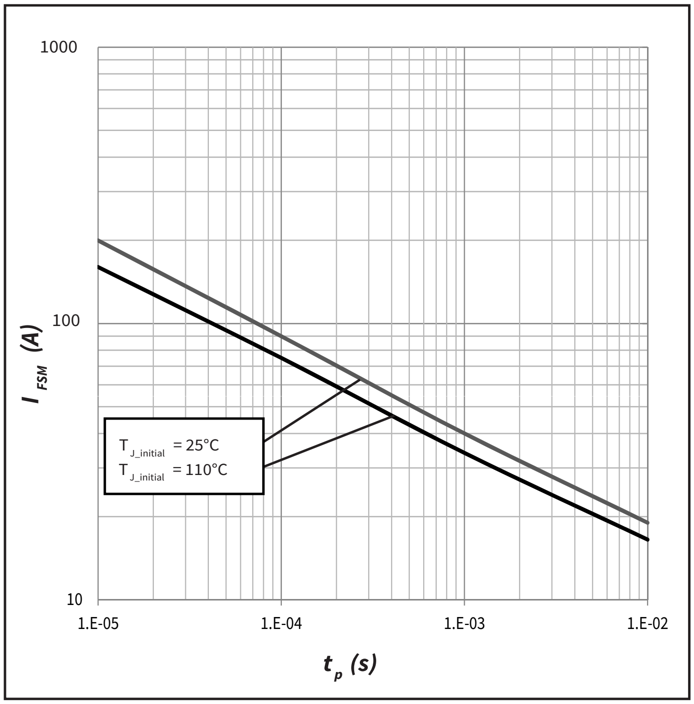


Figure 8. Non-Repetitive Peak Forward Surge Current Versus Pulse Duration (Sinusoidal Waveform)

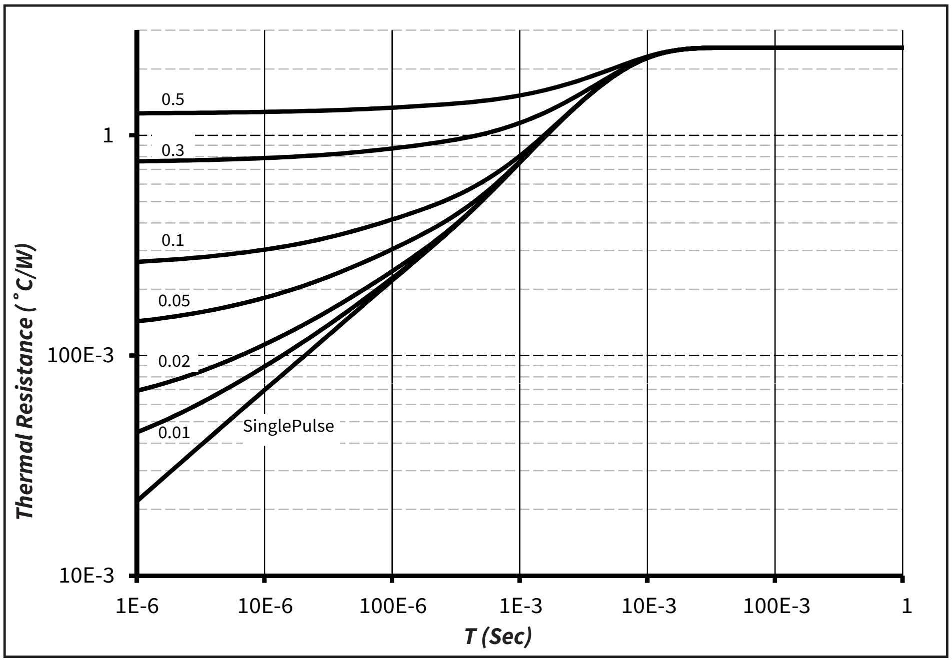
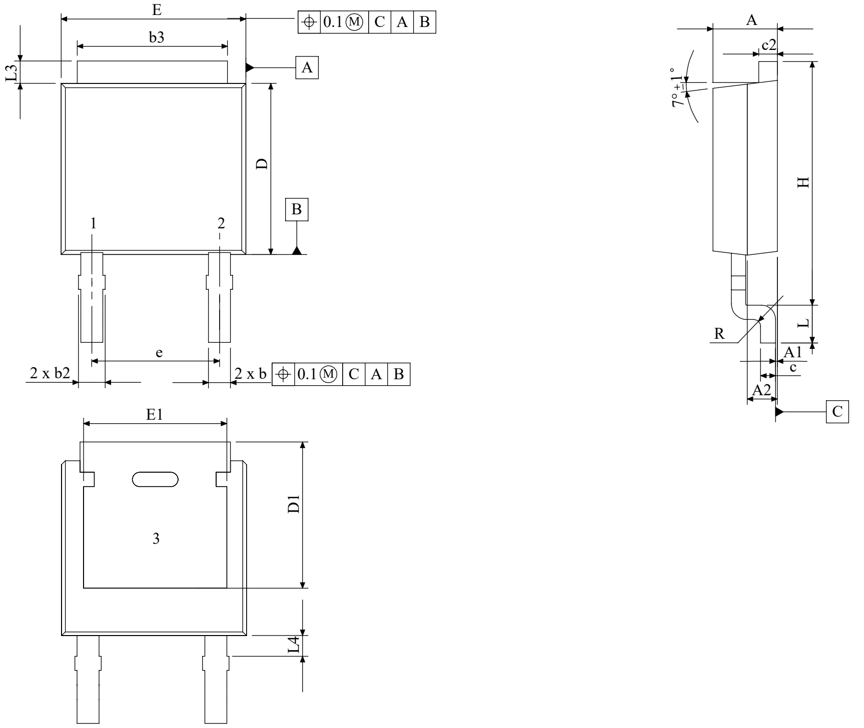


Figure 9. Transient Thermal Impedance

Package Dimensions

Package: TO-252-2



SYMBOL	MIN (mm)	MAX (mm)
A	2.184	2.388
A1	0.00	0.127
A2	0.97	1.17
b	0.64	0.88
b2	0.635	1.143
b3	5.004	5.60
c	0.46	0.58
c2	0.457	0.864
D	5.867	6.248
D1	5.21	---
E	6.35	6.73
E1	4.32	---
e	4.521	4.623
H	9.652	10.414
L3	0.889	1.27
L	1.245	1.445
L4	0.462 REF	
R	0.254 TYP	

1	CATHODE
2	ANODE
3	CATHODE

NOTE
1. ALL METAL SURFACES ARE TIN PLATED (MATTE), EXCEPT AREA OF CUT.
2. DIMENSIONING & TOLERANCING CONFORM TO ASME Y14.5M-1994.
3. ALL DIMENSIONS ARE LISTED IN MILLIMETERS. ANGLES ARE IN DEGREES.
4. PACKAGE BURR FLASH SIZE (0.5 mm) IS NOT INCLUDED IN THE DIMENSIONS

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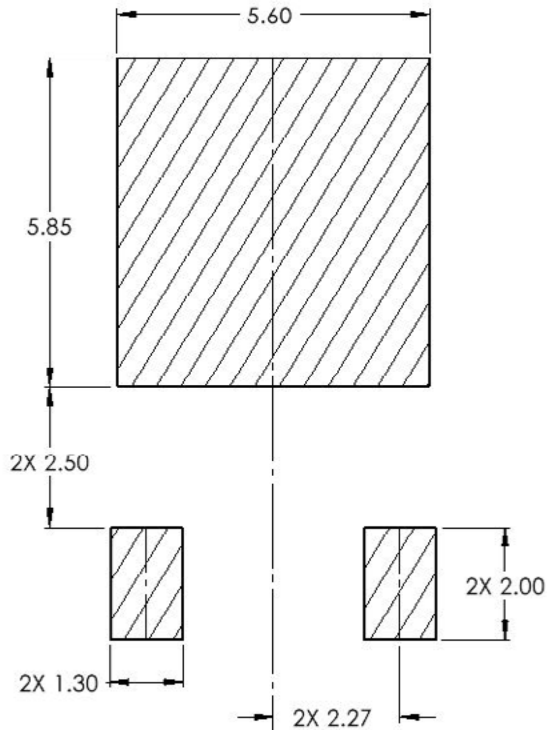
TITLE: PACKAGE OUTLINE DRAWING: TO 252-2L

REVISION NO. 01 A4

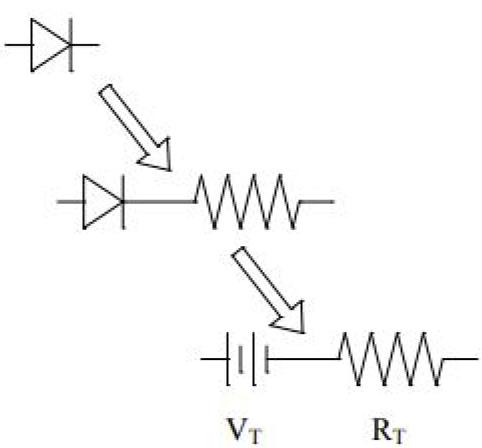
Date: 04/13/22 SCALE:1:1 SHEET 1 OF 1

Recommended Solder Pad Layout



Part Number	Package	Marking
C4D02120E	TO-252-2	C4D02120

Diode Model



$$V_{fT} = V_T + If * R_T$$

$$V_T = 0.9592 + (T_J * -1.20 * 10^{-3})$$
$$R_T = 0.1673 + (T_J * 2.10 * 10^{-3})$$

Note: T_J = Diode Junction Temperature in Degrees Celsius, valid from 25°C to 175°C

Revision History

Current Revision	Date of Release	Description of Changes
11	September-2023	Updated Wolfspeed branding, package drawing, and solder pad layout
12	October-2023	Corrected solder pad layout and diode model

Notes & Disclaimer

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REACh Compliance

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