



ACE7401B

P-Channel Enhancement Mode Field Effect Transistor

Description

The ACE7401B uses advanced trench technology to provide excellent $R_{DS(ON)}$, and ultra-low low gate charge with a 25V gate rating. This device is suitable for use as a load switch or in PWM applications.

Features

- $V_{DS}(V)=-30V$
- $I_D=-29A$ ($V_{GS}=-10V$)
- $R_{DS(ON)} < 13m\Omega$ ($V_{GS}=-20V$)
- $R_{DS(ON)} < 14m\Omega$ ($V_{GS}=-10V$)
- $R_{DS(ON)} < 17m\Omega$ ($V_{GS}=-5V$)

Absolute Maximum Ratings

Parameter	Symbol	Max	Unit	
Drain-Source Voltage	V_{DSS}	-30	V	
Gate-Source Voltage	V_{GSS}	± 25	V	
Drain Current (Continuous)	$T_A=25^\circ C$	-29	A	
	$T_A=100^\circ C$	-23		
Drain Current (Pulse) ^C	I_{DM}	-60		
Drain Current (Continuous)	$T_A=25^\circ C$	-12		I_{DSM}
	$T_A=75^\circ C$	-9.7		
Power Dissipation ^B	$T_A=25^\circ C$	29	W	
	$T_A=100^\circ C$	12		
Power Dissipation ^A	$T_A=25^\circ C$	3.1		P_{DSM}
	$T_A=70^\circ C$	2		
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ C$	

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	30	40	$^\circ C/W$
Maximum Junction-to-Ambient ^{AD}		60	75	
Maximum Junction-to-Lead	$R_{\theta JL}$	3.5	4.2	

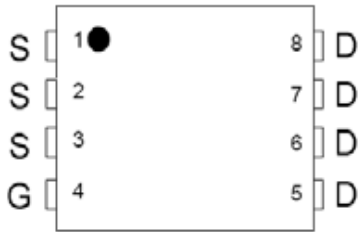


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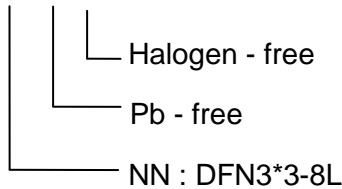
Packaging Type

DFN3*3-8L



Ordering information

ACE7401B XX + H



Electrical Characteristics

$T_A=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-30			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-30V, V_{GS}=0V$			-1	μA
Gate Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$			100	nA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=-20V, I_D=-10A$		8.2	13	m Ω
		$V_{GS}=-10V, I_D=-10A$		9.2	14	
		$V_{GS}=-5V, I_D=-7A$		13.1	17	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_{DS}=-250\mu A$	-1.5	-1.8	-3	V
Forward Transconductance	g_{FS}	$V_{DS}=-5V, I_D=-10A$		26		S
Diode Forward Voltage	V_{SD}	$I_{SD}=-1A, V_{GS}=0V$		-0.72	-1	V
Maximum Body-Diode Continuous Current	I_S				-4.2	A
Switching						
Total Gate Charge	Q_g	$V_{DS}=-15V, I_D=-12A$ $V_{GS}=-10V$		46.64	60.63	nC
Gate-Source Charge	Q_{gs}			7.84	10.2	
Gate-Drain Charge	Q_{gd}			9.96	12.95	
Turn-On Delay Time	$T_{d(on)}$	$V_{DS}=-15V, R_L=1.25\Omega,$ $V_{GS}=-10V, R_{GEN}=3\Omega$		19.24	38.48	ns
Turn-On Rise Time	t_f			8.56	17.12	



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Turn-Off Delay Time	$t_{d(off)}$		69.8	139.6	
Turn-Off Fall Time	t_f		18.52	37.04	
Dynamic					
Input Capacitance	C_{iss}	$V_{DS}=-15V, V_{GS}=0V$ $f=1MHz$	2777.96		pF
Output Capacitance	C_{oss}		380.67		
Reverse Transfer Capacitance	C_{rss}		217.7		

Note:

1. The value of RqJA is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The Power dissipation P_{DSM} is based on RqJA t≤10s value and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design, and the maximum temperature of 150°C may be used if the PCB allows it.
2. The power dissipation P_D is based on T_{J(MAX)}=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
3. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150°C. Ratings are based on low frequency and duty cycles to keep initial T_J =25°C.
4. The RqJA is the sum of the thermal impedance from junction to case RqJC and case to ambient.
5. The static characteristics in Figures 1 to 6 are obtained using <300ms pulses, duty cycle 0.5% max.
6. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)}=150°C. The SOA curve provides a single pulse rating.
7. The maximum current rating is package limited.
8. These tests are performed with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C

Typical Performance Characteristics

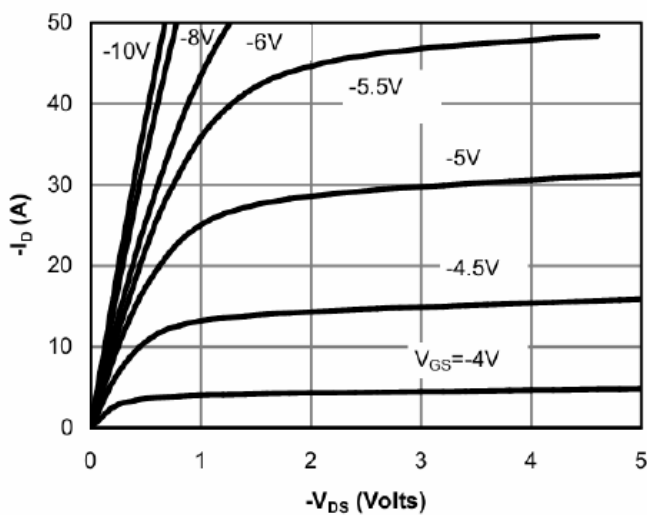


Fig 1: On-Region Characteristics

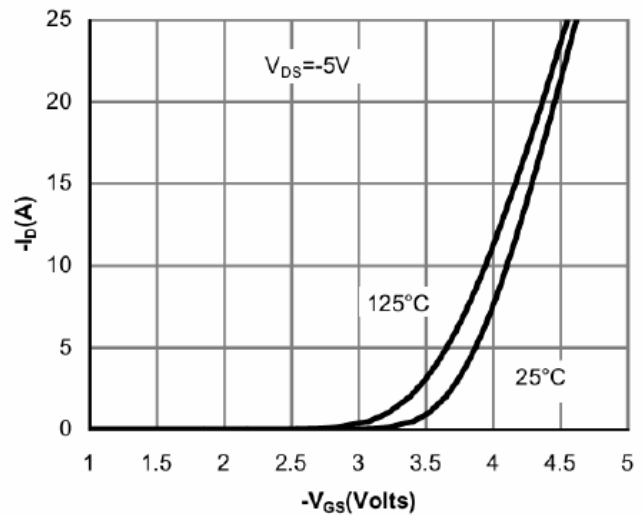


Figure 2: Transfer Characteristics



Typical Performance Characteristics

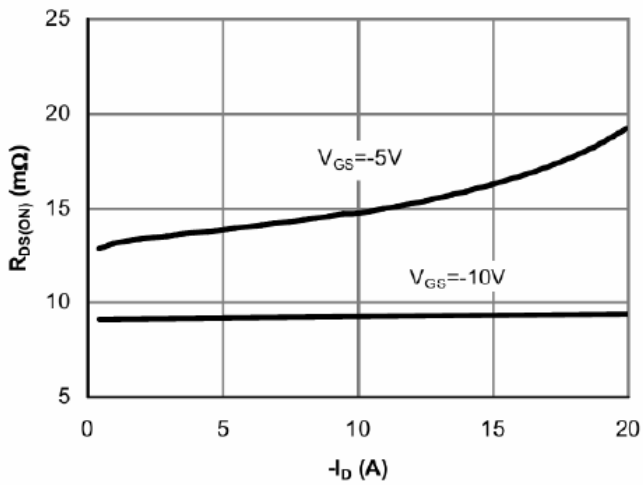


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

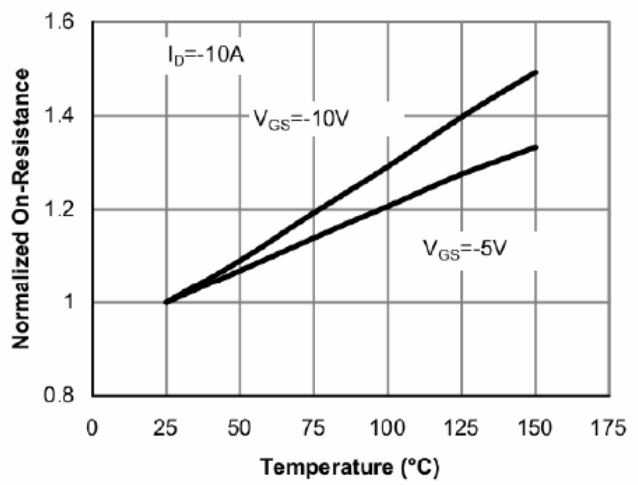


Figure 4: On-Resistance vs. Junction Temperature

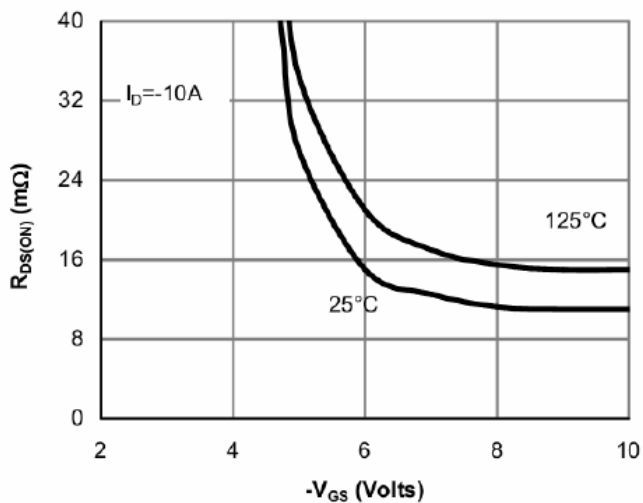


Figure 5: On-Resistance vs. Gate-Source Voltage

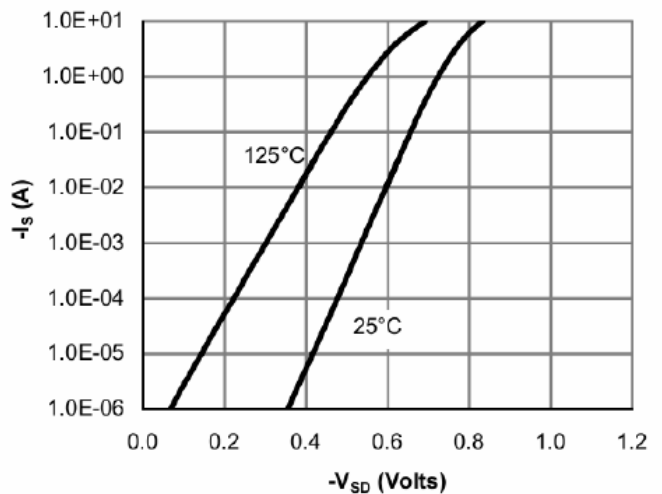


Figure 6: Body-Diode Characteristics

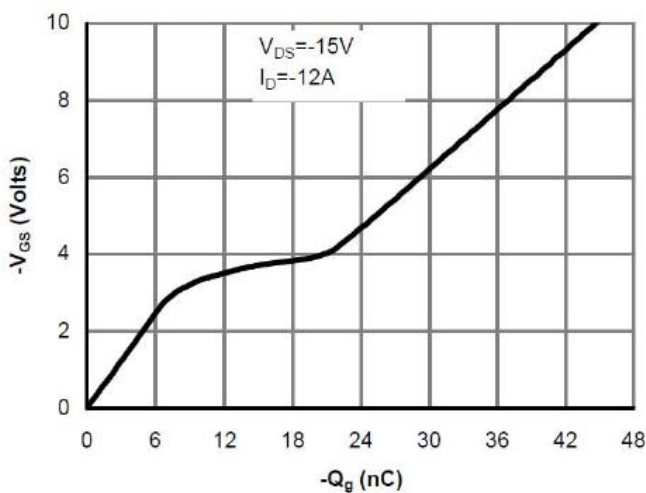


Figure 7: Gate-Charge Characteristics

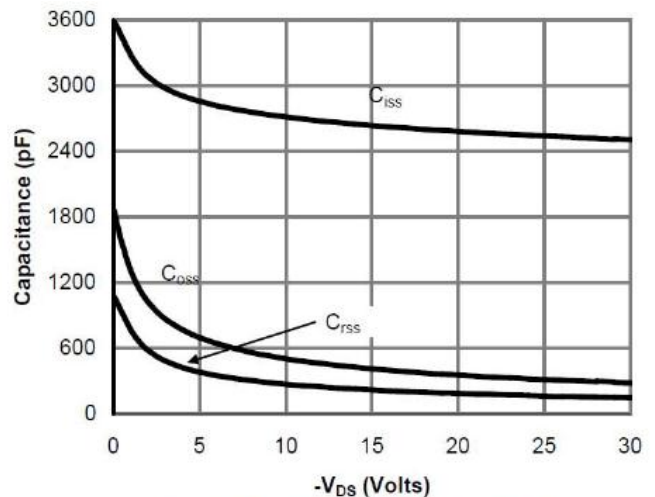


Figure 8: Capacitance Characteristics



Typical Performance Characteristics

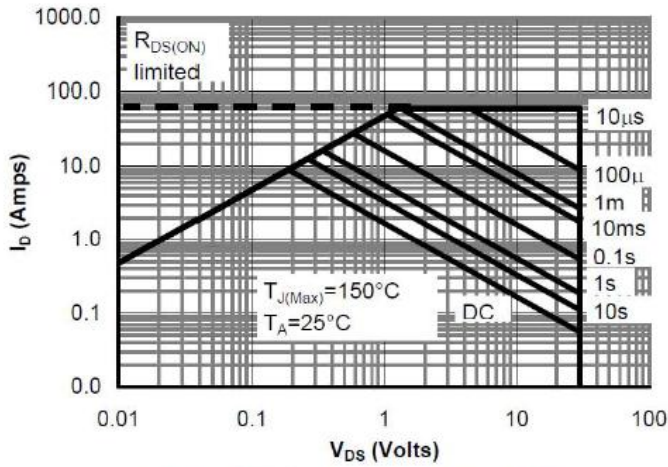


Figure 9: Maximum Forward Biased Safe Operating Area

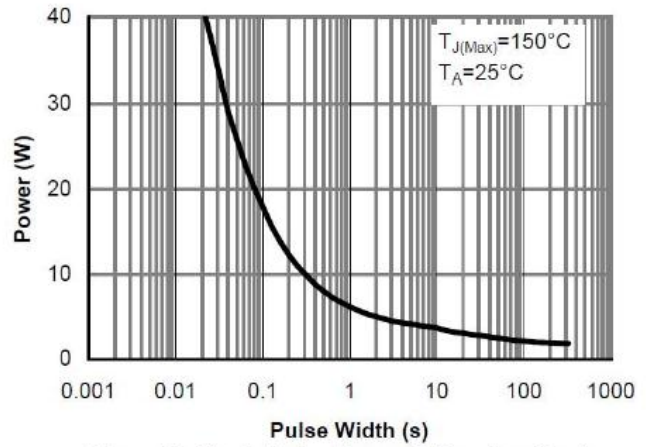


Figure 10: Single Pulse Power Rating Junction-to-Ambient

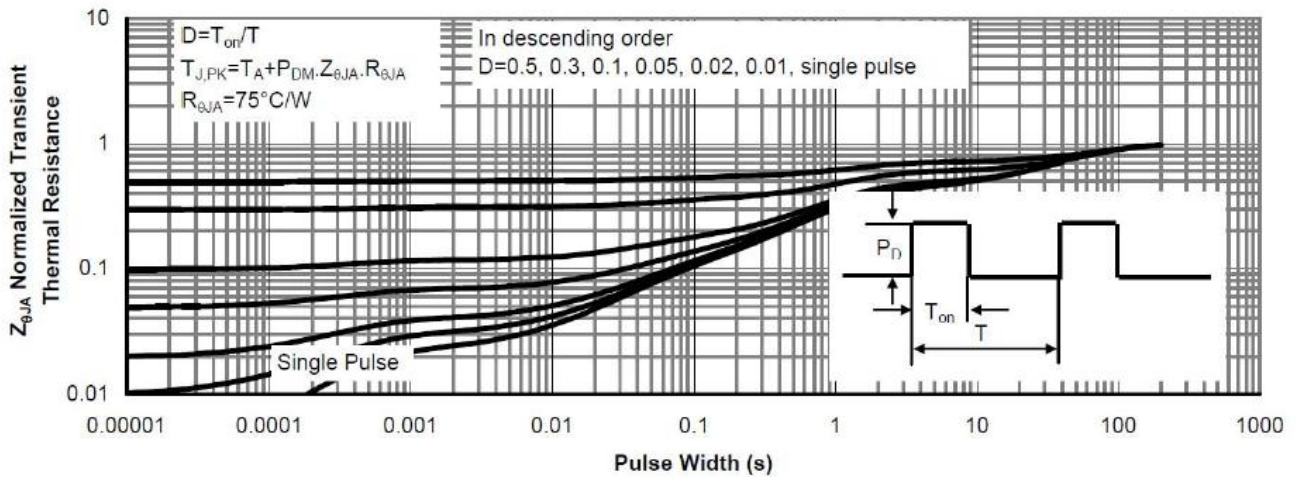


Figure 11: Normalized Maximum Transient Thermal Impedance

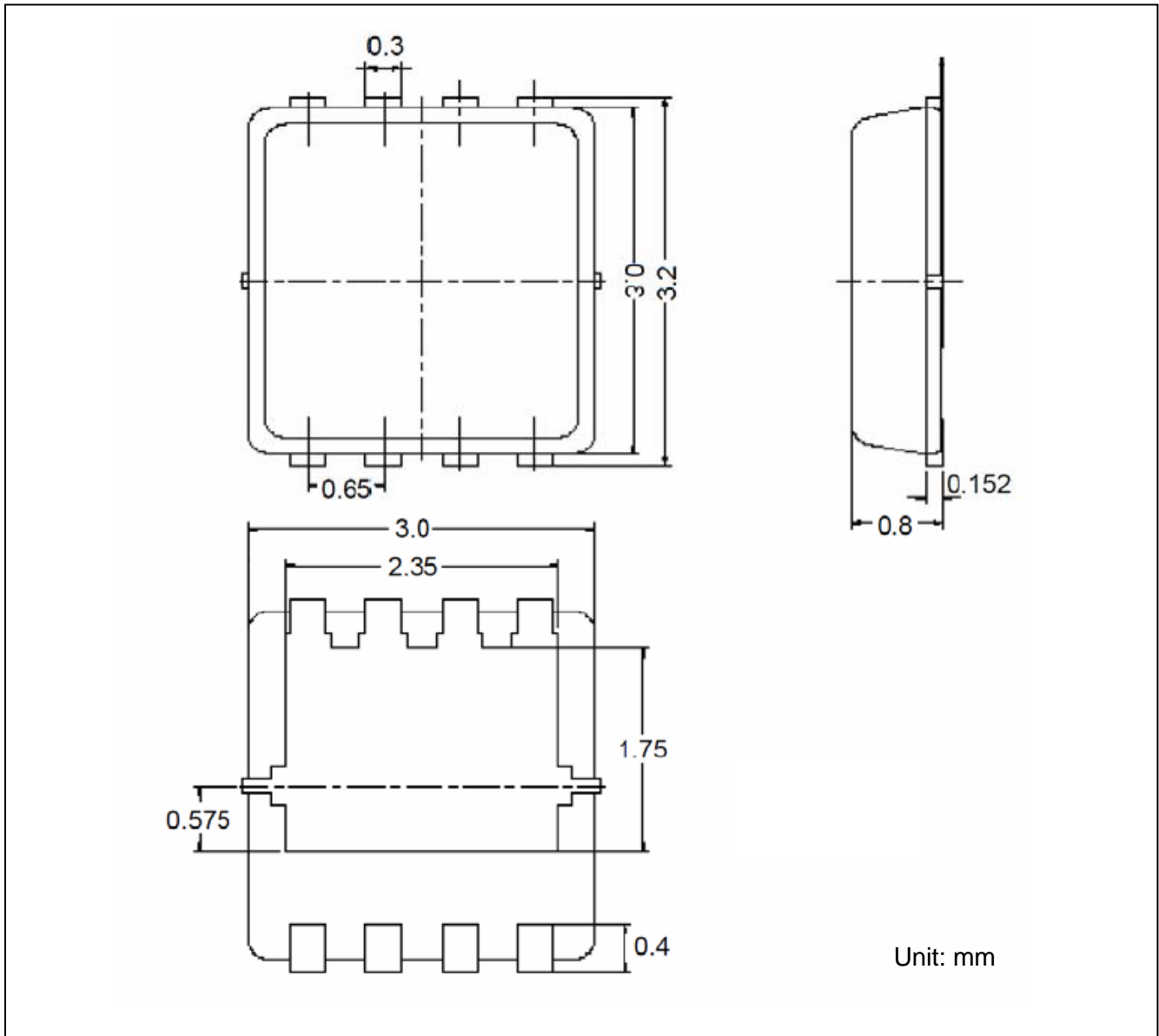


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Packing Information

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Notes

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1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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