CTL0452NS

N-Channel Enhancement MOSFET

Features

- Drain-Source Breakdown Voltage V_{DSS} 20 V
- Drain-Source On-Resistance

  $R_{DS(ON)}$ 22mΩ, at V_{GS}= 4.5V, I_{DS}= 4.5A

  $R_{DS(ON)}$ 27mΩ, at V_{GS}= 2.5V, I_{DS}= 4.0A
- Continuous Drain Current at T_C=25˚C I_D = 4.5A
- Advanced high cell density Trench Technology
- RoHS Compliance & Halogen Free

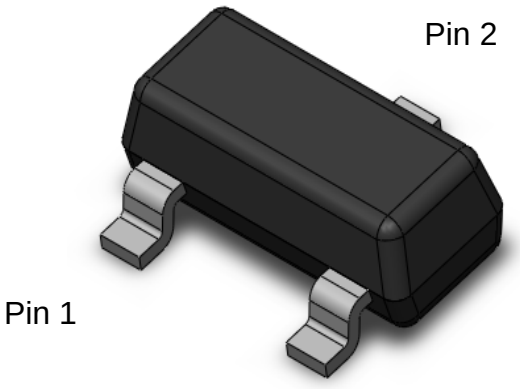
Description

The CTL0452NS uses high performance Trench Technology to provide excellent $R_{DS(ON)}$ and low gate charge which is suitable for most of the synchronous buck converter applications .

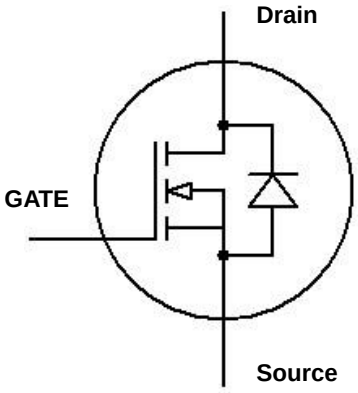
Applications

- Power Management
- Lithium Ion Battery

Package Outline



Schematic



Gate: Pin 1
Drain: Pin2
Source: Pin3

Absolute Maximum Rating at 25°C

Symbol	*Parameters*	*Ratings*	*Units*	*Notes*
V_{DS}	Drain-Source Voltage	20	V	
V_{GS}	Gate-Source Voltage	±8	V	
I_D	Continuous Drain Current	4.5	A	1
I_{DM}	Pulsed Drain Current	13.5	A	1
P_D	Total Power Dissipation	1.25	W	2
T_{STG}	Storage Temperature Range	-55 to 150	°C	
T_J	Operating Junction Temperature Range	-55 to 150	°C	

Thermal Characteristics

Symbol	*Parameters*	*Test Conditions*	*Min*	*Typ*	*Max*	*Units*	*Notes*
$R_{\Theta JA}$	Thermal Resistance Junction-Ambient (t=10s)		-	175	-	°C /W	1,4

Electrical Characteristics T_C = 25°C (unless otherwise specified)

Static Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
B_{VDSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D= 250μA	20	-	-	V	
I_{DSS}	Drain-Source Leakage Current	V_{DS} = 20V, V_{GS} = 0V	-	-	1	μA	
I_{GSS}	Gate-Source Leakage Current	V_{GS} = ±8V, V_{DS} = 0V	-	-	±100	nA	

On Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
$R_{DS(ON)}$	Drain-Source On-Resistance	V_{GS} = 4.5V, I_D = 4.5A	-	22	33	mΩ	Fig 4
		V_{GS} = 2.5V, I_D = 4.0A	-	27	40	mΩ	
$V_{GS(TH)}$	Gate-Source Threshold Voltage	V_{GS} = V_{DS}, I_D =250μA	0.4	-	1.0	V	Fig 5

Dynamic Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
C_{ISS}	Input Capacitance	V_{DS} = 8V ,	-	600	-	pF	Fig 3
C_{OSS}	Output Capacitance	V_{GS} = 0V,	-	81	-		
C_{RSS}	Reverse Transfer Capacitance	f=1MHz	-	75	-		

Switching Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
$T_{D(ON)}$	Turn-On Delay Time	V_{DS} = 10V , V_{GS} = 4.5V, R_G = 6Ω, I_D =1A	-	3.5	-	ns	Fig 11 & 12
T_R	Rise Time		-	23	-		
$T_{D(OFF)}$	Turn-Off Delay Time		-	39	-		
T_F	Fall Time		-	24			
Q_G	Total Gate Charge	V_{DS} = 10V , V_{GS} = 4.5V, I_D = 4.5A	-	7.5	-	nC	Fig 9 & 10
Q_{GS}	Gate-Source Charge		-	1.1	-		
Q_{GD}	Gate-Drain (Miller) Charge		-	2	-		

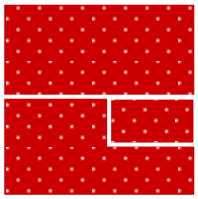
Drain-Source Diode Characteristics

Symbol	*Parameters*	*Test Conditions*	*Min*	*Typ*	*Max*	*Units*	*Notes*
V_{DS}	Drain-Source Forward Voltage	V_{GS} = 0V, I_D = 4.5A			1.2	V	
I_S	Continuous Forward Current				4.5	A	1

Note:

1. The power dissipation is limited by 150°C junction temperature.

2. Device mounted on a glass-epoxy board



FR-4

25.4 × 25.4 mm .

2 Oz Copper

Actual Size

3. The data tested by pulsed , pulse width ≦ 300μs , duty cycle ≦ 2%

4. Thermal Resistance follow JESD51-3.

Typical Characteristic Curves

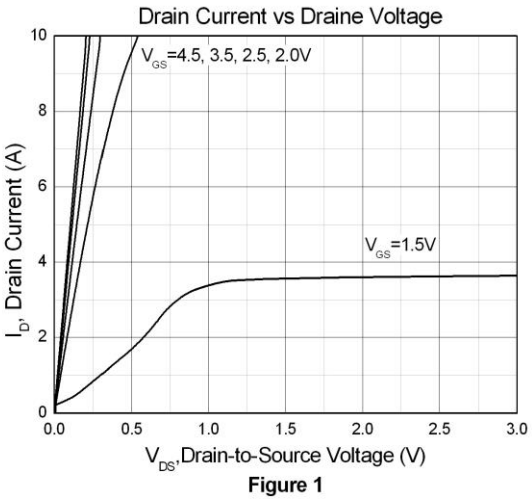


Figure 1

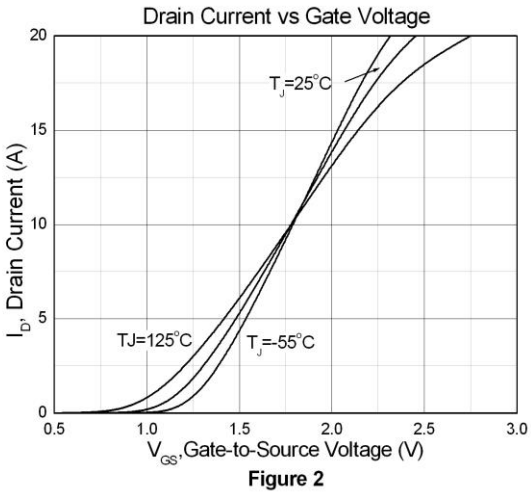


Figure 2

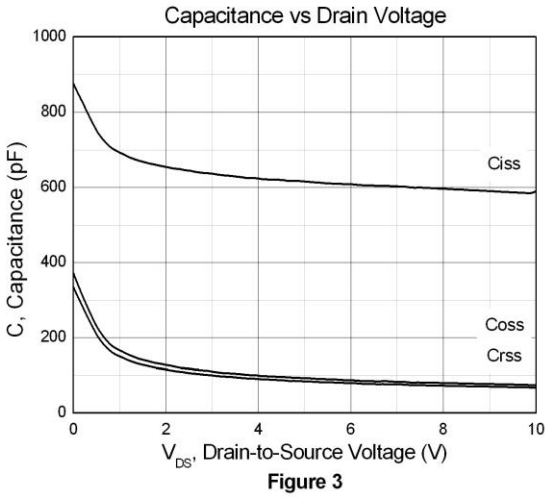


Figure 3

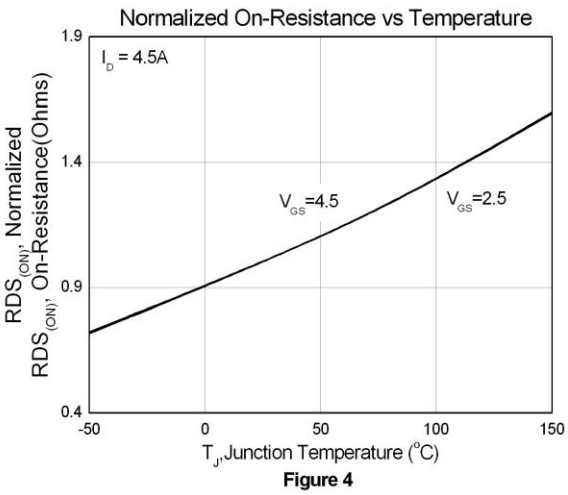


Figure 4

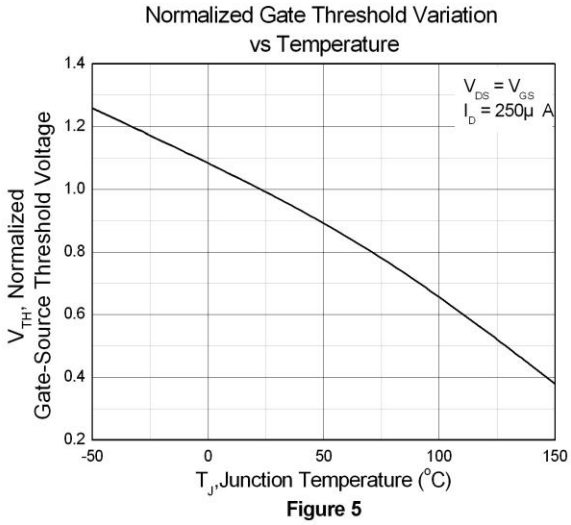


Figure 5

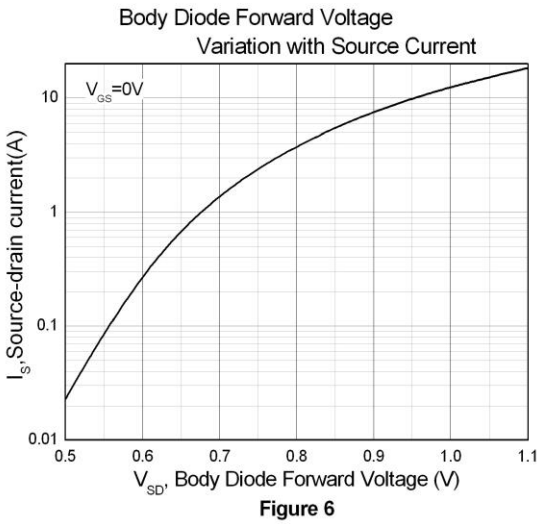


Figure 6

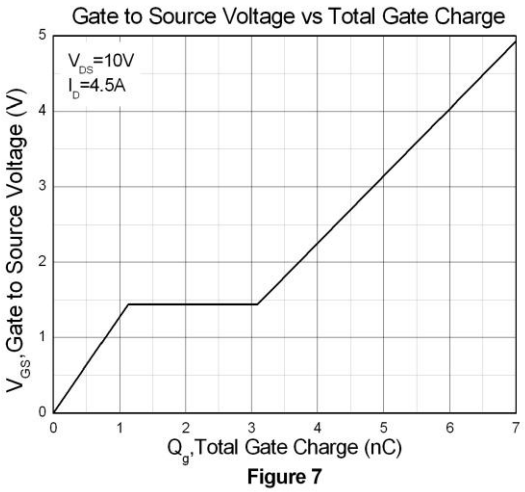


Figure 7

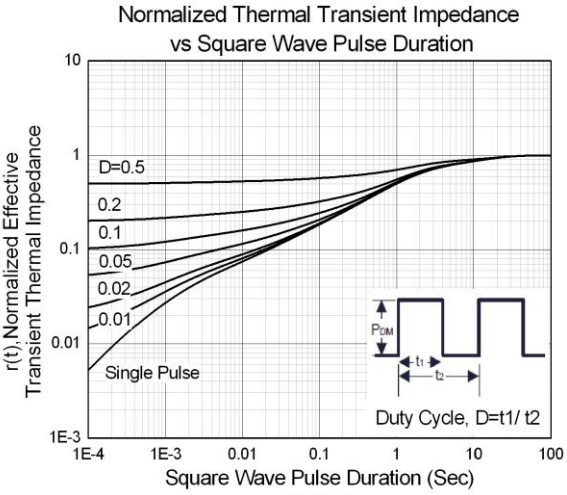


Figure 8

Test Circuits & Waveforms

Figure 9: Gate Charge Test Circuit

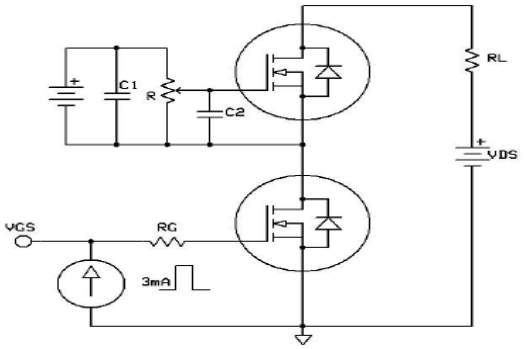


Figure 10: Gate Charge Waveform

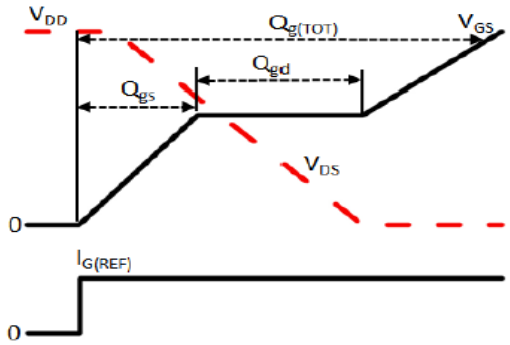


Figure 11: Switching Time Test Circuit

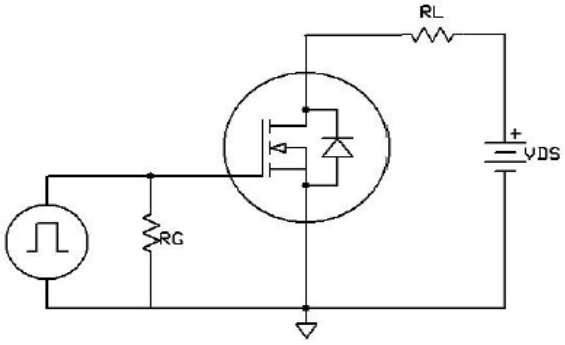
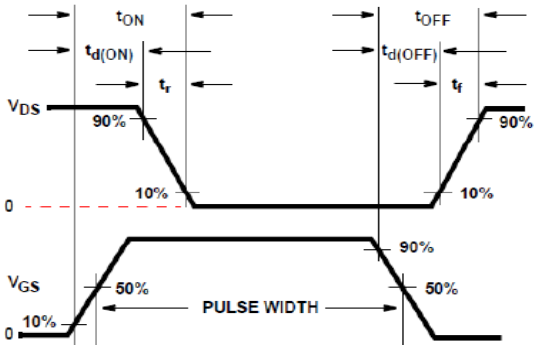
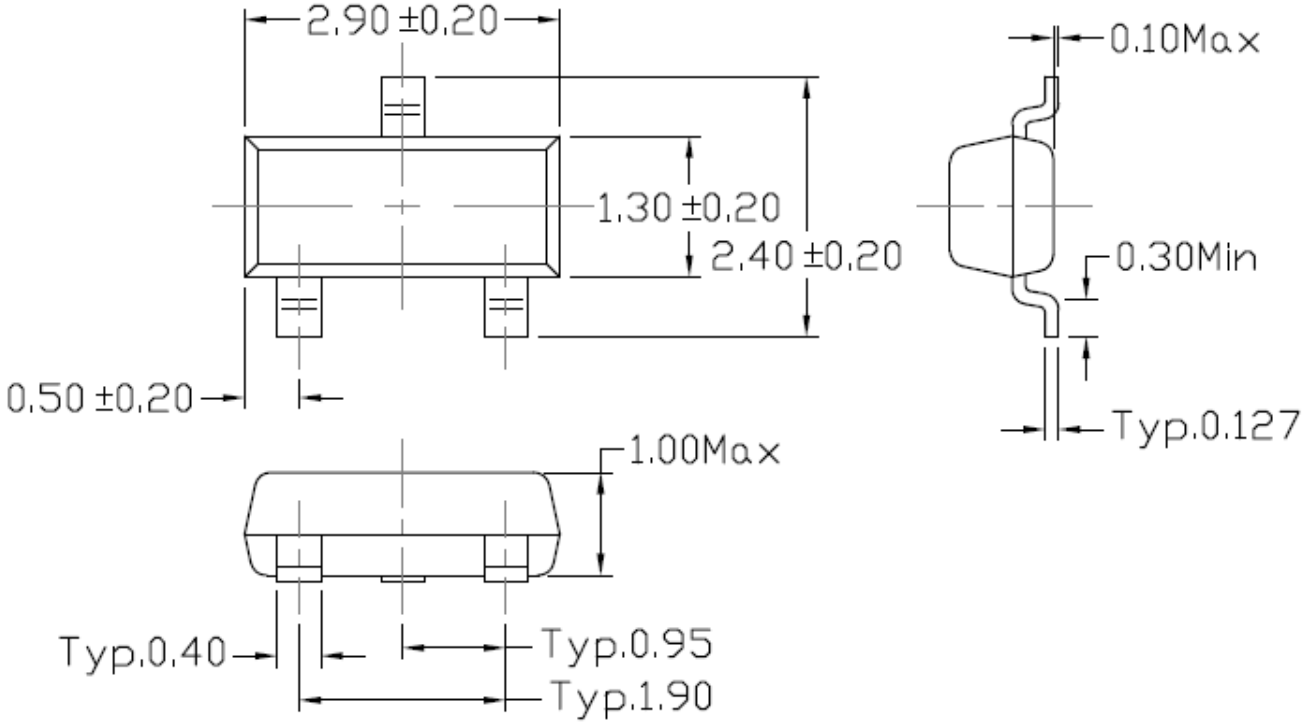


Figure 12: Switching Time Waveform

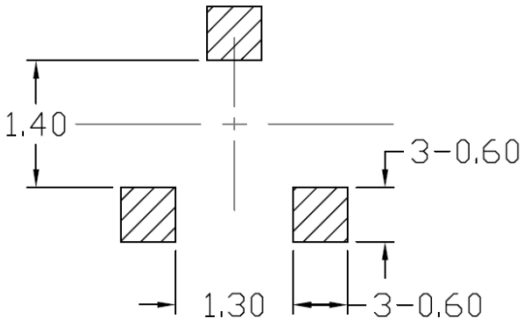


Package Dimension



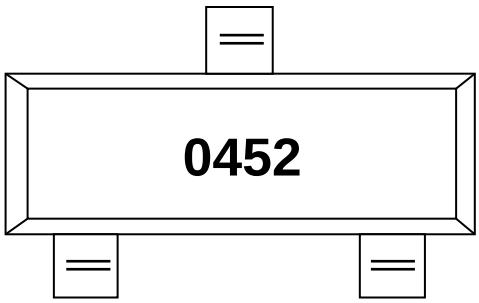
Note: Dimensions in mm

Recommended pad layout for surface mount leadform



Note: Dimensions in mm

Marking Information

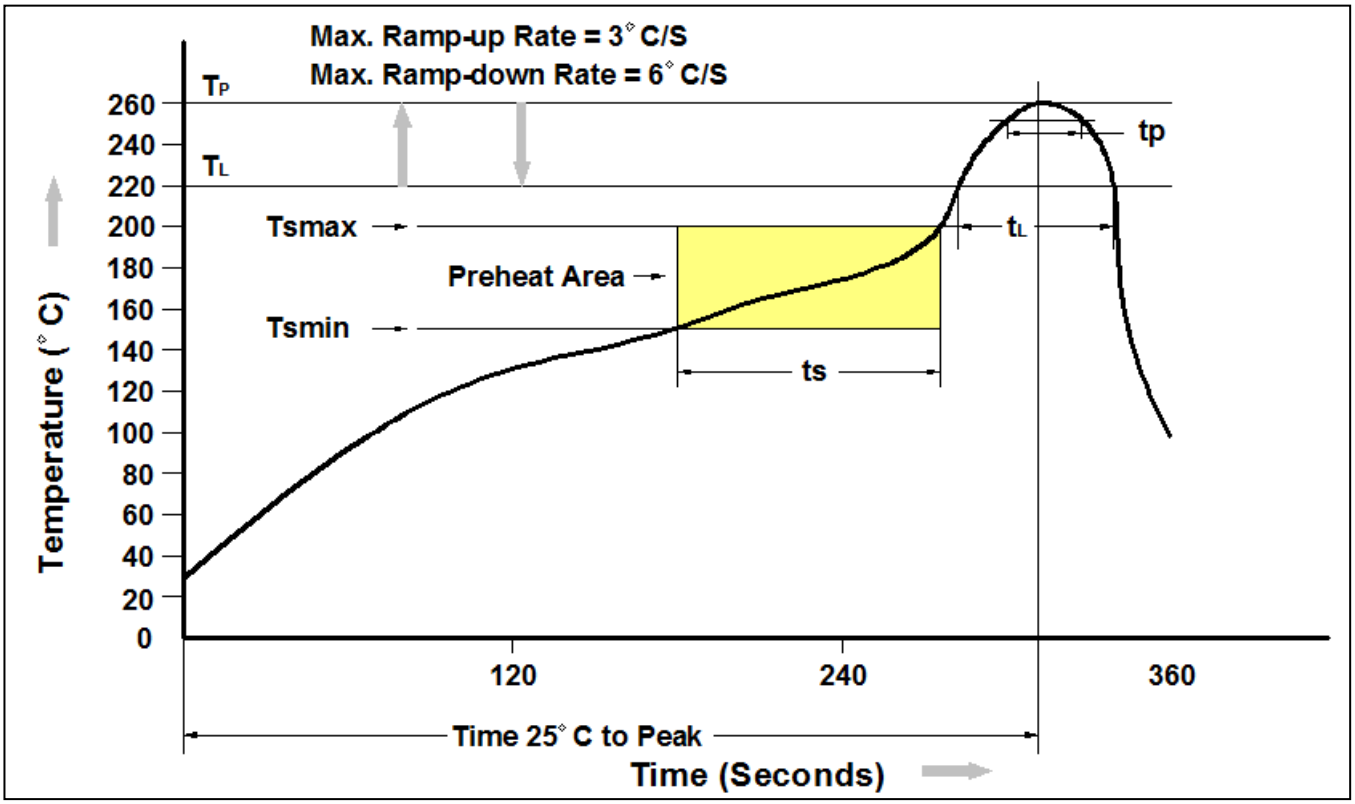


0452 : Device Number

Ordering Information

Part Number	*Description*	*Quantity*
CTL0452NS	SOT-23 Reel	3000 pcs

Reflow Profile



Profile Feature	Pb-Free Assembly Profile
Temperature Min. (Tsmin)	150°C
Temperature Max. (Tsmax)	200°C
Time (ts) from (Tsmin to Tsmax)	60-120 seconds
Ramp-up Rate (t_L to t_P)	3°C/second max.
Liquidous Temperature (T_L)	217°C
Time (t_L) Maintained Above (T_L)	60 – 150 seconds
Peak Body Package Temperature	260°C +0°C / -5°C
Time (t_P) within 5°C of 260°C	30 seconds
Ramp-down Rate (T_P to T_L)	6°C/second max
Time 25°C to Peak Temperature	8 minutes max.

DISCLAIMER

CT MICRO RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. CT MICRO DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

CT MICROELECTRONICS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT EXPRESS WRITTTEN APPROVAL OF CT MICROELECTRONICS LTD.

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, or (c) whose failure to perform when properly used in accordance with instruction for use provided in the labelling, can be reasonably expected to result in 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.*