

## Product Summary

$V_R$	1200V
$I_{F(135/161^\circ\text{C})}$	9.7A/5A
$Q_C$	24nC

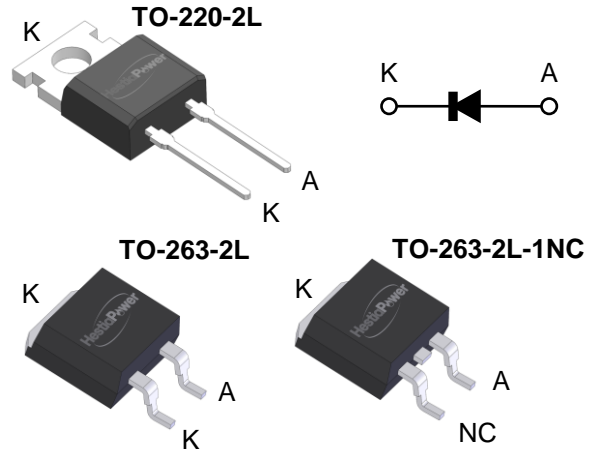


# H4S120A005, H4S120T005, H4S120U005

## Features

- Low Conduction and Switching Loss
- Zero Reverse Recovery
- Temperature Independent Switching Behavior
- Positive Temperature Coefficient Device
- High Surge Current Capability
- RoHS Compliant and Halogen Free
- Optimized for High Power Application
- AEC-Q101 Qualified

## Circuit Diagram



Part Number	Package	Marking
H4S120A005	TO-220-2L	H4S120A005
H4S120T005	TO-263-2L	H4S120T005
H4S120U005	TO-263-2L-1NC	H4S120U005

## Benefits

- Higher System Efficiency
- Increase Parallel Device Convenience
- Enable High Temperature Application
- Allow High Frequency Operation
- Realize Compact and Lightweight Systems
- High Reliability

## Applications

- Switching Mode Power Supply
- PFC
- UPS
- Flywheel diode in Power Inverters
- Solar/Wind Renewable Energy

## Absolute Maximum Ratings ( $T_C = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Value	Unit
Peak Repetitive Reverse Voltage	$V_{RRM}$	$T_J = 25^\circ\text{C}$	1200	V
Peak Reverse Surge Voltage	$V_{RSM}$	$T_J = 25^\circ\text{C}$	1200	V
DC Blocking Voltage	$V_R$	$T_J = 25^\circ\text{C}$	1200	V
Continuous Forward Current	$I_F$	$T_C = 25^\circ\text{C}$	19.8	A
		$T_C = 135^\circ\text{C}$	9.7	
		$T_C = 161^\circ\text{C}$	5	
Non-Repetitive Peak Forward Surge Current	$I_{FSM}$	$T_C = 25^\circ\text{C}, T_p = 10\text{ ms}, \text{Half Sine Wave}$	54	A
		$T_C = 125^\circ\text{C}, T_p = 10\text{ ms}, \text{Half Sine Wave}$	48	
		$T_C = 25^\circ\text{C}, T_p = 10\text{ }\mu\text{s}, \text{Pulse}$	355	
Repetitive Peak Forward Surge Current	$I_{FRM}$	$T_C = 25^\circ\text{C}, T_p = 10\text{ ms}, \text{Half Sine Wave}, D = 0.1$	43	A
		$T_C = 125^\circ\text{C}, T_p = 10\text{ ms}, \text{Half Sine Wave}, D = 0.1$	42	
Power Dissipation	$P_D$	$T_C = 25^\circ\text{C}$	107	W
		$T_C = 125^\circ\text{C}$	35	
$I^2t$ value	$\int i^2 dt$	$T_C = 25^\circ\text{C}, T_p = 10\text{ ms}$	14.5	$\text{A}^2\text{s}$
Junction & Storage Temperature	$T_J, T_{stg}$		-55 to 175	$^\circ\text{C}$
Soldering Temperature	$T_L$		260	
Mounting Torque	$M_D$	M3 or 6-32 screw	1.0	Nm

## Electrical Characteristics (T<sub>c</sub> = 25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
DC Blocking Voltage	V <sub>DC</sub>	I <sub>R</sub> = 100 μA, T <sub>J</sub> = 25°C	> 1200			V
Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 5A, T <sub>J</sub> = 25°C		1.44	1.7	V
		I <sub>F</sub> = 5A, T <sub>J</sub> = 175°C		1.9	2.2	V
Reverse Current	I <sub>R</sub>	V <sub>R</sub> = 1200V, T <sub>J</sub> = 25°C		2.5	100	μA
		V <sub>R</sub> = 1200V, T <sub>J</sub> = 175°C		15	500	μA
Total Capacitive Charge	Q <sub>C</sub>	V <sub>R</sub> = 800V, T <sub>J</sub> = 25°C		24		nC
Total Capacitance	C <sub>J</sub>	V <sub>R</sub> = 0.1V, T <sub>J</sub> = 25°C, f = 1 MHz		348		
		V <sub>R</sub> = 400V, T <sub>J</sub> = 25°C, f = 1 MHz		26		pF
		V <sub>R</sub> = 800V, T <sub>J</sub> = 25°C, f = 1 MHz		19		
Capacitance Stored Energy	E <sub>C</sub>	V <sub>R</sub> = 800V		9.6		μJ

## Thermal Resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance, Junction to Case	R <sub>θJC</sub>		1.4		°C/W

## Naming Rule

**H4 S 120 A 005**

### Generation

H3 = 4<sup>th</sup> Gen Discrete

### Device Type

S = JBS diode (High Power)    D = JBS diode (High Speed)

### Breakdown Voltage

065 = 650V    120 = 1200V    170 = 1700V

### Package

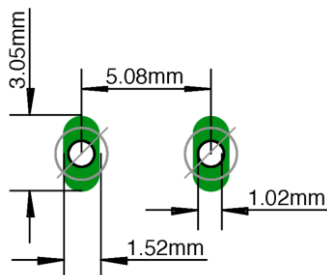
A = TO-220-2L    T = TO-263-2L    U = TO-263-2L-1NC

### Typical Current Rating

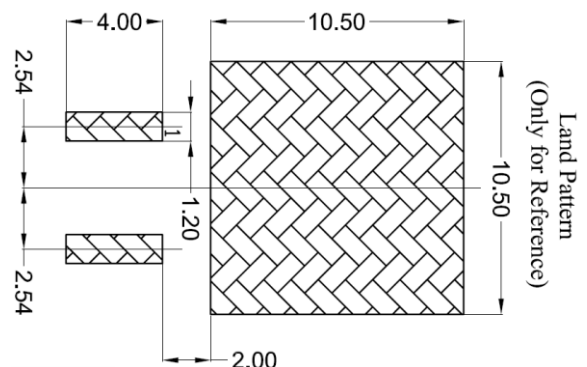
002 = 2A    005 = 5A    008 = 8A    010 = 10A    012 = 12A    020 = 20A

## Recommended Solder Pad Layout

### TO-220-2L



### TO-263-2L, TO-263-2L-1NC



## Typical Device Performance

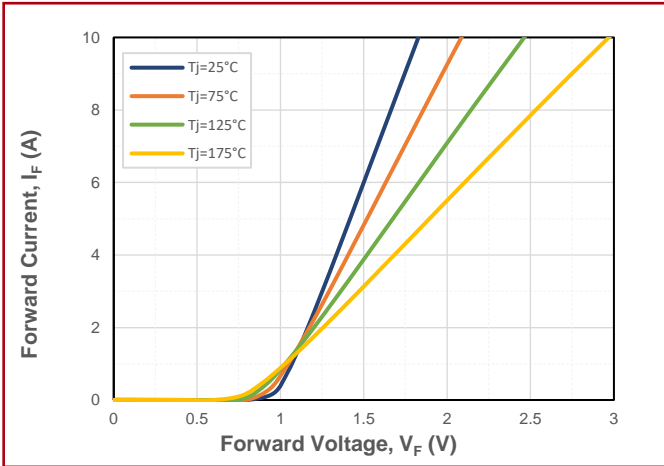


Fig.1 Forward Characteristics

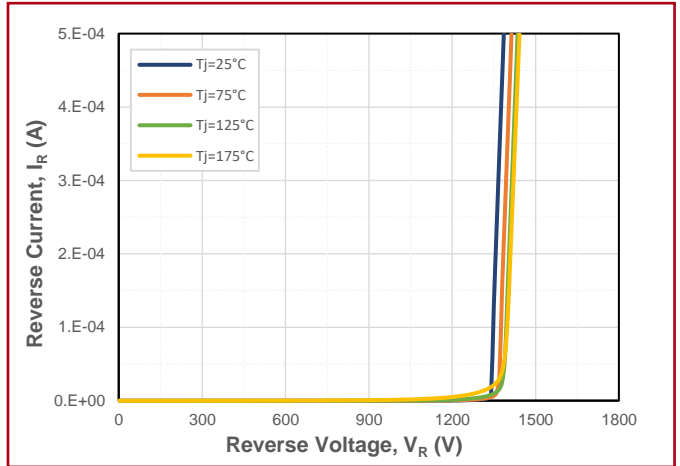


Fig.2 Reverse Characteristics

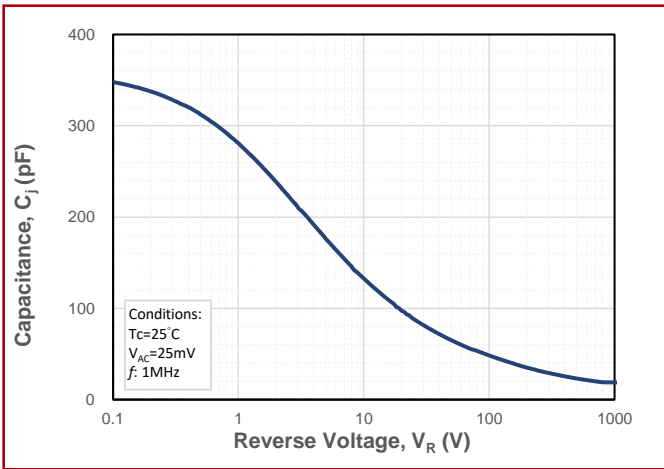


Fig.3 Junction Capacitance vs. Reverse Voltage

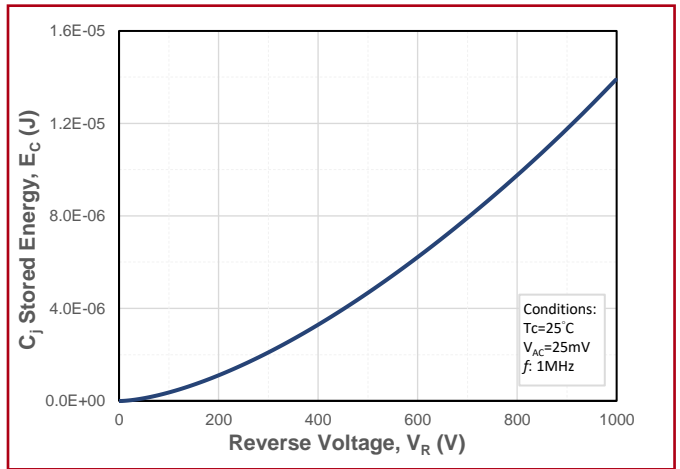


Fig.4 Capacitance Stored Energy

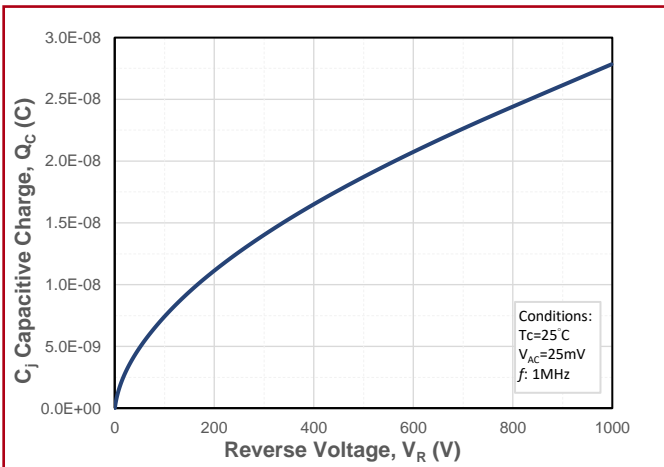


Fig.5 Recovery Charge vs. Reverse Voltage

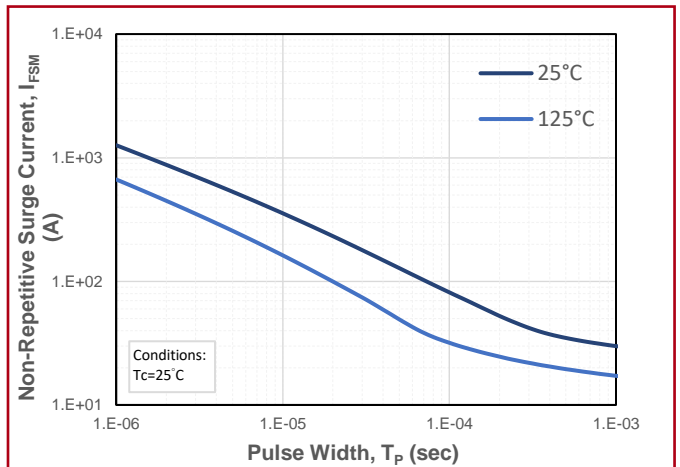
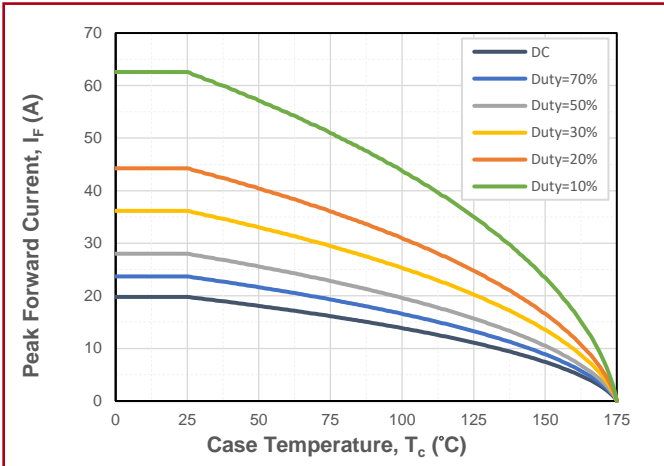
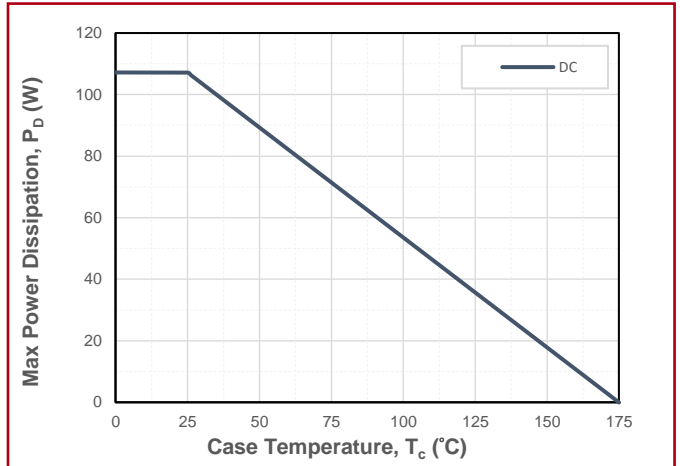


Fig.6 Non-Repetitive Peak Forward Surge Current (Pulse Mode)

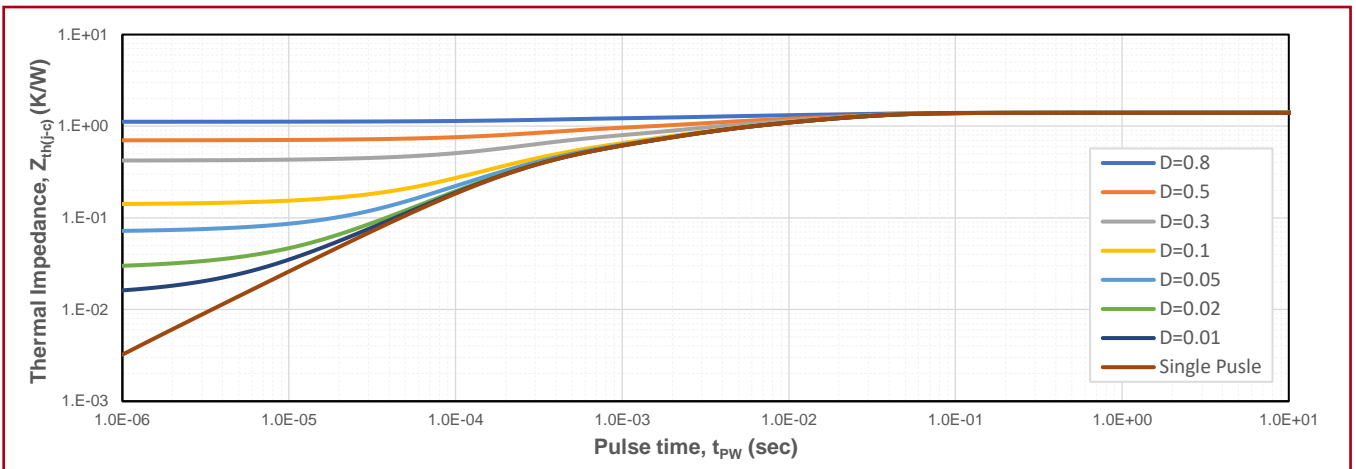
### Typical Device Performance



**Fig.7 Maximum Forward Current Derating vs. Case Temperature**



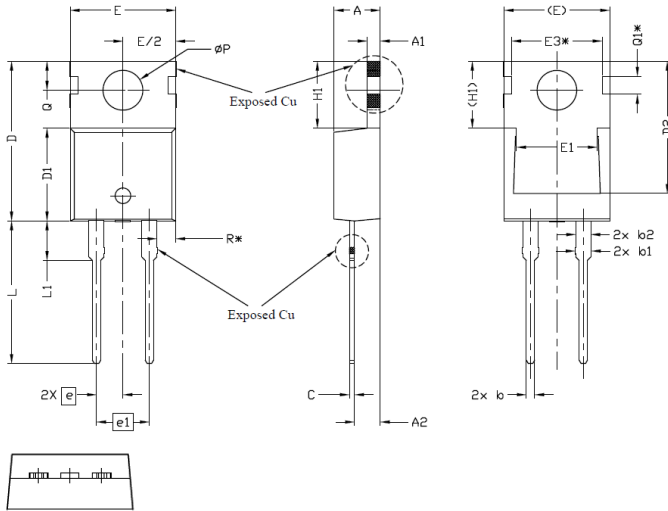
**Fig.8 Maximum Power Dissipation Derating vs. Case Temperature**



**Fig.9 Transient Junction to Case Thermal Impedance**

The information provided herein is subject to change without notice.

## Package Dimensions (TO-220-2L)

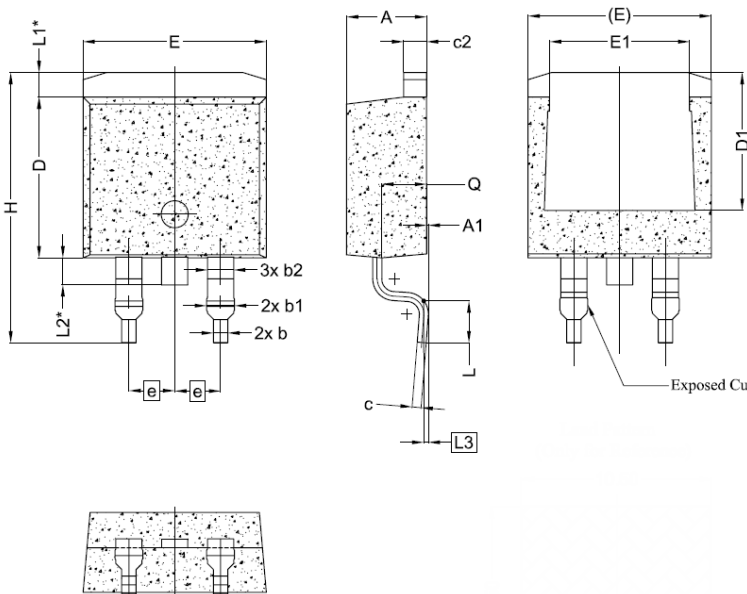


**Note:**

1. Package Reference: JEDEC TO220, Variation AB.
2. All Dimensions Are In mm.
3. Slot Required, Notch May Be Rounded
4. Dimension D & E Do Not Include Mold Flash. Mold Flash Shall Not Exceed 0.127mm Pre Side. These Dimensions Are Measured At The Outermost Extreme Of The Plastic Body.
5. Thermal Pad Contour Optional Within Dimensions E, H1, D2 & E1.
6. Dimension E2 & H1 Define A Zone Where Stamping And Singulation Irregularities Are Allowed.
7. "\*" is reference .

Symbol	mm		
	Min.	Typ.	Max.
A	4.24	4.44	4.64
A1	1.15	1.27	1.40
A2	2.30	2.48	2.70
b	0.70	0.80	0.90
b1	1.20	1.55	1.75
b2	1.20	1.45	1.70
c	0.40	0.50	0.60
D	14.70	15.37	16.00
D1	8.82	8.92	9.02
D2	12.63	12.73	12.83
E	9.96	10.16	10.36
E1	6.86	7.77	8.89
E3*	8.70 REF.		
e	2.54 BSC		
e1	5.08 BSC		
H1	6.30	6.45	6.60
L	13.47	13.72	13.97
L1	3.60	3.80	4.00
phi P	3.75	3.84	3.93
Q	2.60	2.80	3.00
Q1*	1.73 REF.		
R*	1.82 REF.		

## Package Dimensions (TO-263-2L, TO-263-2L-1NC)



Symbol	mm		
	Min.	Typ.	Max.
A	4.24	4.44	4.64
A1	0.00	0.10	0.25
b	0.70	0.80	0.90
b1	1.20	1.55	1.75
b2	1.20	1.45	1.70
c	0.40	0.50	0.60
c2	1.15	1.27	1.40
D	8.82	8.92	9.02
D1	6.86	7.65	---
E	9.96	10.16	10.36
E1	6.89	7.77	7.89
e	2.54 BSC		
e1	5.08 BSC		
H	14.61	15.00	15.88
L	1.78	2.32	2.79
L1	1.36 REF.		
L2	0.00 REF. (TO-263-2L) 1.50 REF. (TO-263-2L-1NC)		
L3	0.25 BSC		
Q	2.30	2.48	2.70

**Note:**

1. All Dimensions Are In mm.
2. Dimension D & E Do Not Include Mold Flash. Mold Flash Shall Not Exceed 0.127mm Pre Side. These Dimensions Are Measured At The Outermost Extreme Of The Plastic Body.
3. Thermal Pad Contour Optional Within Dimensions E, L1, D1 & E1.
4. Dimension D1 & E1 Establish A Minnum Mounting Surface for The Thermal Pad.
5. "\*" is reference .