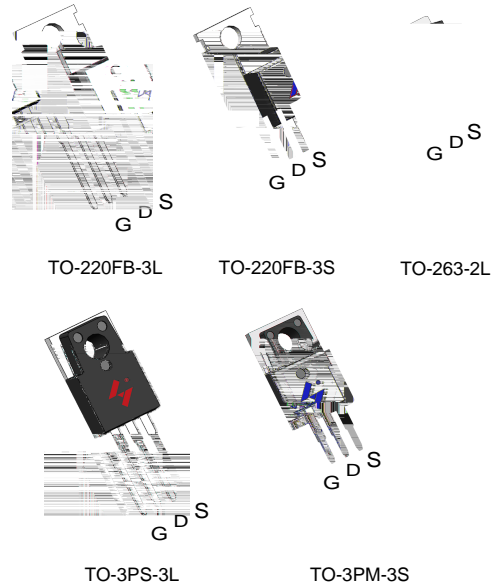


## N-Channel Enhancement Mode MOSFET

### Features

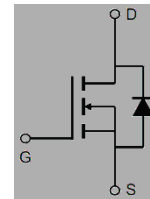
- 150V/120A  
 $R_{DS(ON)} = 12\text{ m}\Omega$  (typ.) @  $V_{GS}=10\text{V}$
- 100% avalanche tested
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

### Pin Description








### Applications

- Switching application
- Power Management for Inverter Systems.



N-Channel MOSFET

### Ordering and Marking Information

 P HY3215 YYXXJWW G	 M HY3215 YYXXJWW G	 B HY3215 YYXXJWW G	<b>Package Code</b> P : TO-220FB-3L    M : TO-220FB-3S B: TO-263-2L        PS: TO-3PS-3L PM: TO-3PM-3S
 PS HY3215 YYXXJWW G	 PM HY3215 YYXXJWW G		<b>Date Code</b> <b>Assembly Material</b> YYXX WW                      G : Lead Free Device

Note: HUAYI lead-free products contain molding compounds/die attach materials and 100% matte tin plate Termination finish; which are fully compliant with RoHS. HUAYI lead-free products meet or exceed the lead-free requirements of IPC/JEDEC J-STD-020 for MSL classification at lead-free peak reflow temperature. HUAYI defines "Green" to mean lead-free (RoHS compliant) and halogen free (Br or Cl does not exceed 900ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500ppm by weight).

HUAYI reserves the right to make changes, corrections, enhancements, modifications, and improvements to this product and/or to this document at any time without notice.

## Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
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**Common Ratings** ( $T_c=25^\circ\text{C}$  Unless Otherwise Noted)

480\*\*

1025\*\*\*

**HY3215**

150

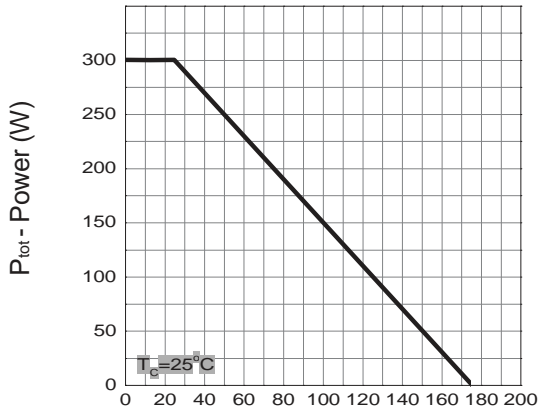
**Electrical Characteristics (Cont.)** ( $T_C = 25\text{ C}$  Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	HY3215			Unit
			Min.	Typ.	Max.	
<b>Dynamic Characteristics</b>						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1MHz$	-	3.2	-	
$C_{iss}$	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=25V,$ Frequency=1.0MHz	-	5785	-	pF
$C_{oss}$	Output Capacitance		-	548	-	
$C_{rss}$	Reverse Transfer Capacitance		-	321	-	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=75V, R_G=3\ \Omega,$ $I_{DS}=60A, V_{GS}=10V,$	-	26	-	ns
$T_r$	Turn-on Rise Time		-	39	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	77	-	
$T_f$	Turn-off Fall Time		-	58	-	
<b>Gate Charge Characteristics</b>						
$Q_g$	Total Gate Charge	$V_{DS}=120V, V_{GS}=10V,$ $I_{DS}=60A$	-	137	-	nC
$Q_{gs}$	Gate-Source Charge		-	28	-	
$Q_{gd}$	Gate-Drain Charge		-	46	-	

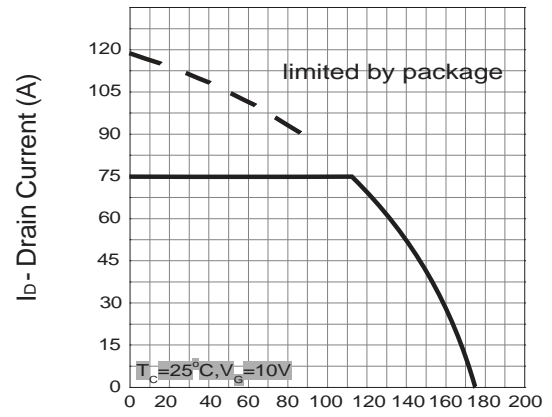
Note \* : Pulse test ; pulse width 300  $\mu$ s, duty cycle 2%.

# Typical Operating Characteristics

### Power Dissipation



### Drain Current



# Typical Operating Characteristics (Cont.)

**Output Characteristics**

$I_D$  - Drain Current (A)

$V_{DS}$  - Drain-Source Voltage (V)

**Drain-Source On Resistance**

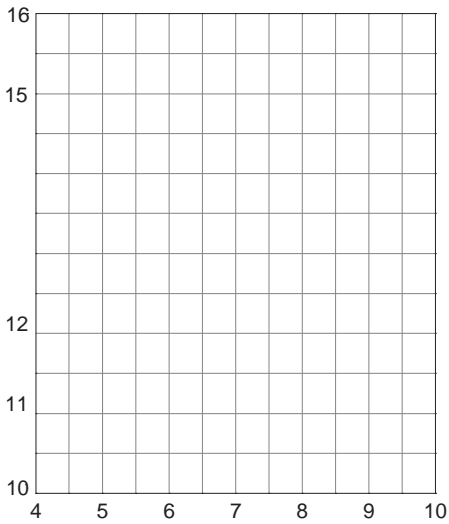
$R_{DS(ON)}$  - On - Resistance (m  $\Omega$ )

11

$I_D$  - Drain Current (A)

**Drain-Source On Resistance**

$R_{DS(ON)}$  - On - Resistance (m  $\Omega$ )



$V_{GS}$  - Gate - Source Voltage (V)

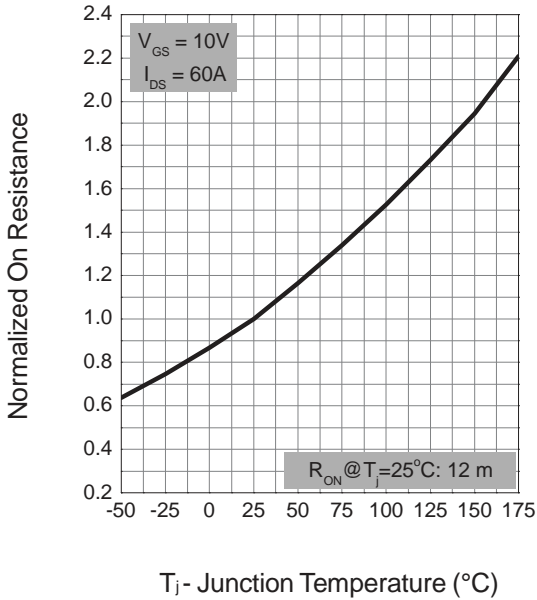
**Gate Threshold Voltage**

Normalized Threshold Voltage

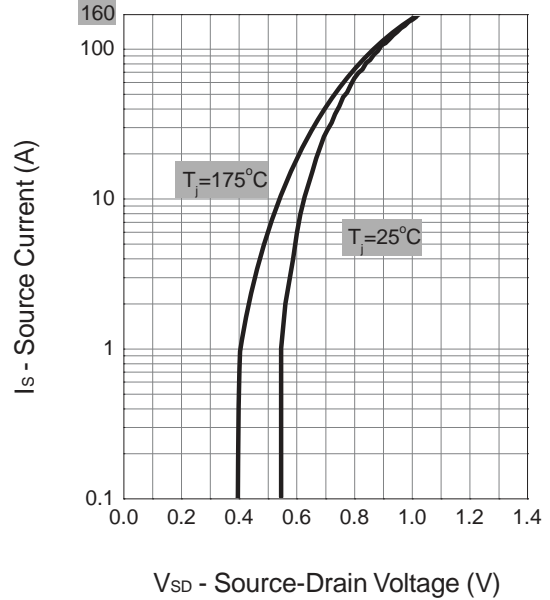
$T_j$  - Junction Temperature ( $^{\circ}C$ )

# Typical Operating Characteristics (Cont.)

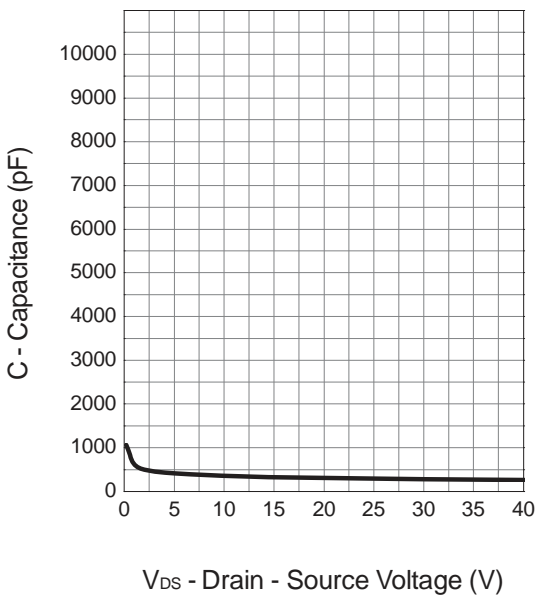
**Drain-Source On Resistance**



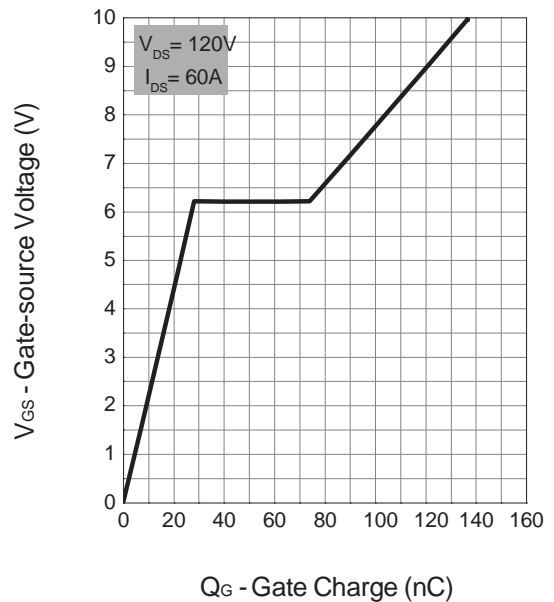
**Source-Drain Diode Forward**



**Capacitance**

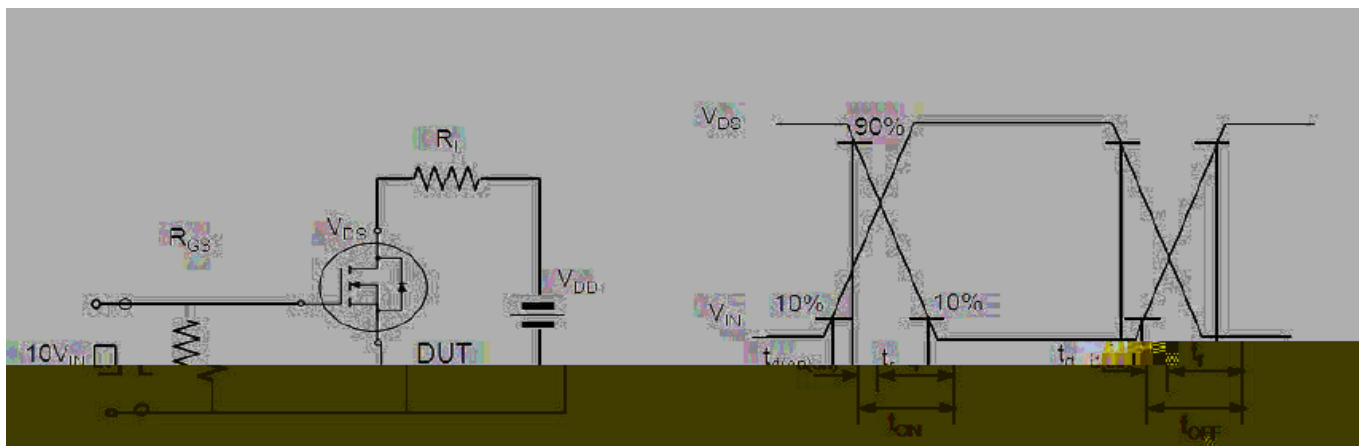


**Gate Charge**



## Avalanche Test Circuit

## Switching Time Test Circuit



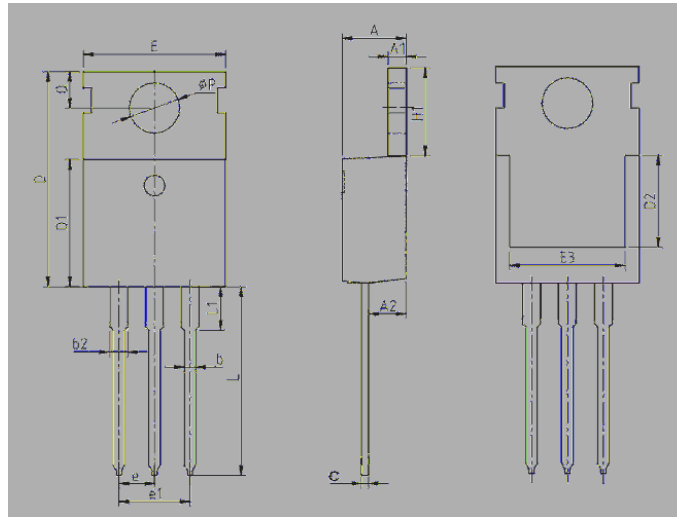
## Gate Charge Test Circuit

## Device Per Unit

Package Type	Unit	Quantity
TO-220FB-3L	Tube	50

## Package Information

### TO-220FB-3L



#### COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.25	1.30	1.45
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b2	1.17	1.27	1.47
c	0.40	0.50	0.65
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.50	-	-
E	9.70	10.00	10.30
E3	7.00	-	-
e	2.54 BSC		
e1	5.08 BSC		
H1	6.25	6.50	6.85
L	12.75	13.50	13.80
L1	-	3.10	3.40
ΦP	3.40	3.60	3.80
Q	2.60	2.80	3.00

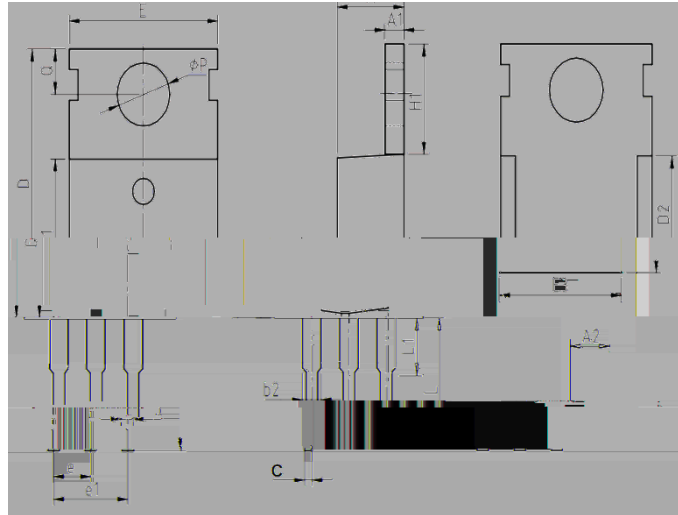


## Device Per Unit

Package Type	Unit	Quantity
TO-220FB-3S	Tube	50

## Package Information

### TO-220FB-3S



COMMON DIMENSIONS

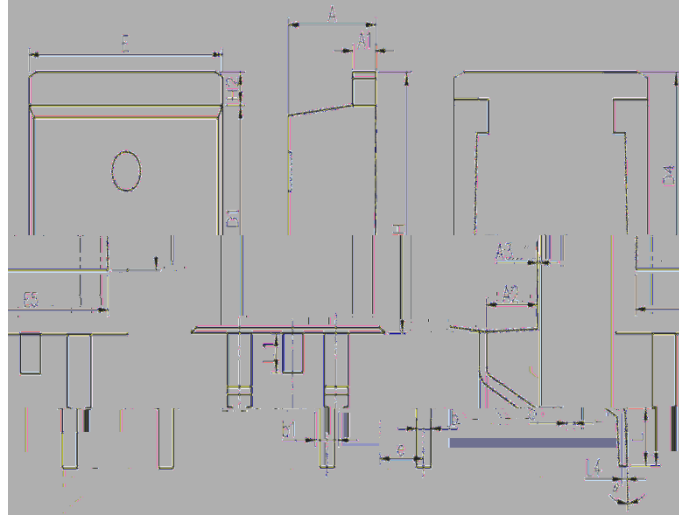
SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.25	1.30	1.45
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b2	1.17	1.27	1.47
c	0.40	0.50	0.65
D	15.10	15.60	16.10
D1	8.10	9.10	9.40
D2	5.50	-	-
E	9.70	10.00	10.30
E3	7.00	-	-
e	2.54 BSC		
e1	5.08 BSC		
H1	6.25	6.50	6.85
L	6.80	7.00	7.20
L1	-	3.10	3.40
ΦP	3.40	3.60	3.80
Q	2.60	2.80	3.00

## Device Per Unit

Package Type	Unit	Quantity
TO-263-2L	Reel	50

## Package Information

### TO-263-2L



COMMON DIMENSIONS

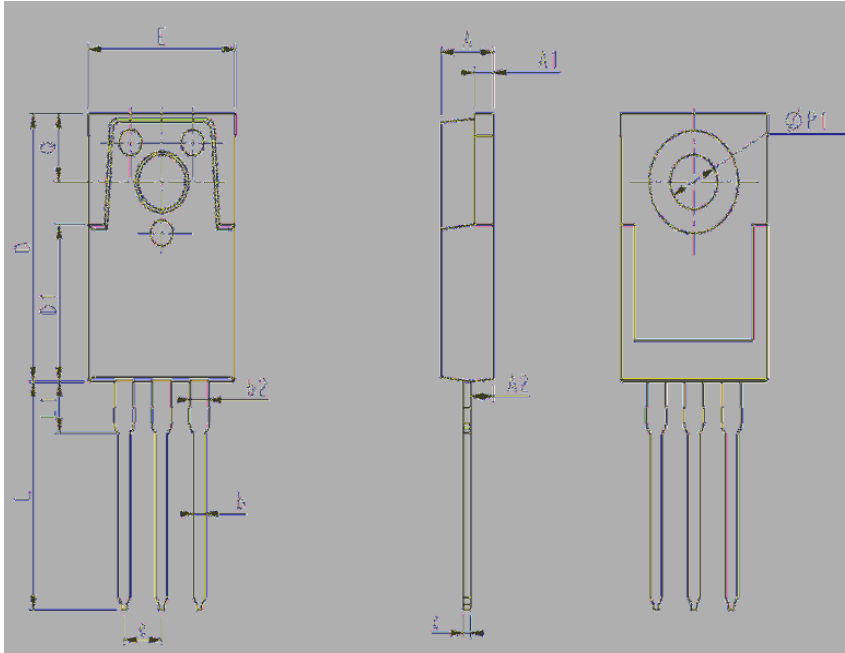
SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.22	1.27	1.42
A2	2.49	2.69	2.89
A3	0	0.13	0.25
b	0.7	0.81	0.96
b1	1.17	1.27	1.47
c	0.3	0.38	0.53
D1	8.5	8.7	8.9
D4	6.6	-	-
E	9.86	10.16	10.36
E5	7.06	-	-
e	2.54 BSC		
H	14.7	15.1	15.5
H2	1.07	1.27	1.47
L	2	2.3	2.6
L1	1.4	1.55	1.7
L4	0.25 BSC		
θ	0°	5°	9°

## Device Per Unit

Package Type	Unit	Quantity
TO-3PS-3L	Tube	50

## Package Information

### TO-3PS-3L



COMMON DIMENSIONS

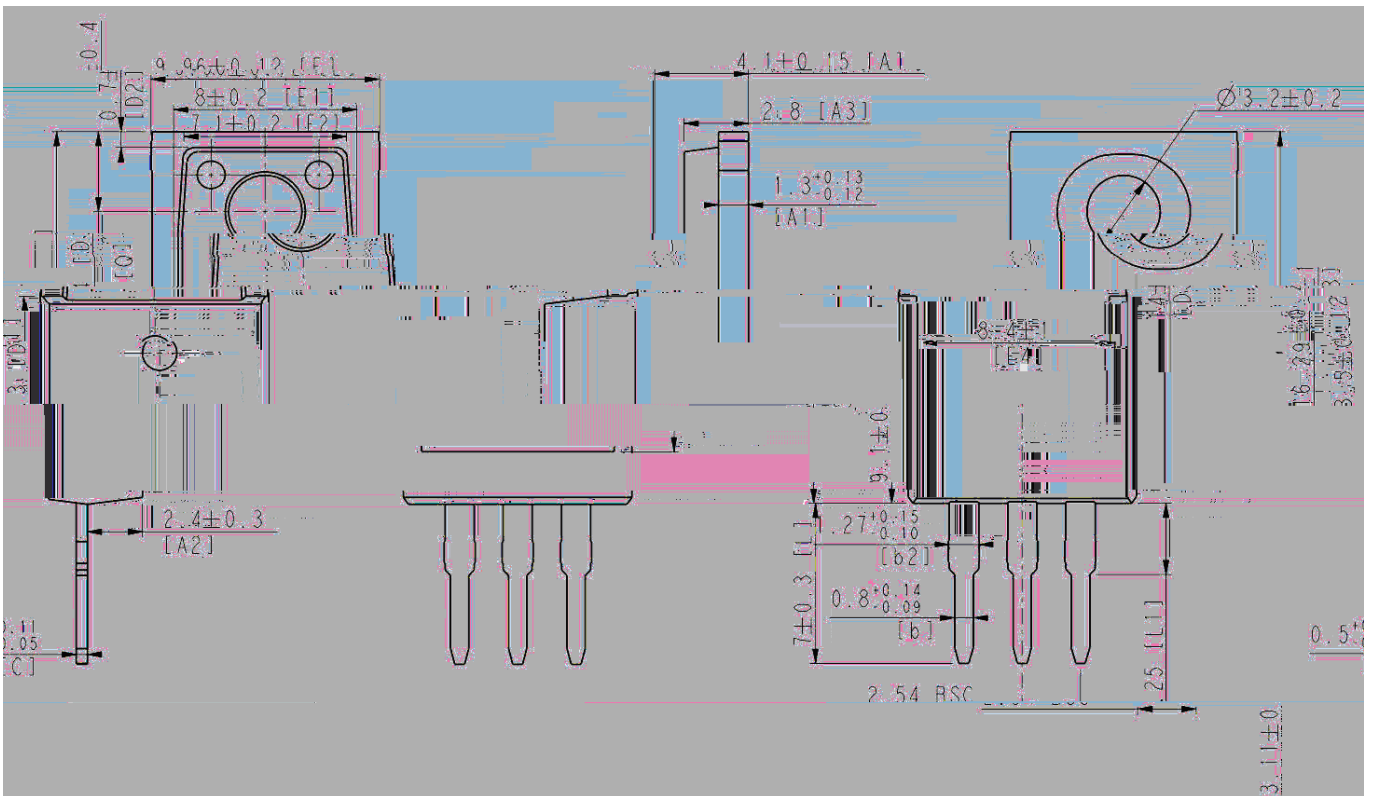
SYMBOL	mm		
	MIN	NOM	MAX
A	3.36	3.56	3.76
A1	1.25	1.30	1.40
A2	1.39	1.54	1.69
b	0.75	0.80	0.90
b2	1.17	1.27	1.42
c	0.45	0.50	0.60
D	15.45	15.70	15.95
D1	9.00	9.20	9.40
E	9.88	10.00	10.20
e	2.54 BSC		
L	13.20	13.40	13.60
L1	-	3.00	3.30
ΦP1	3.20 REF		
Q	3.88	4.00	4.12

## Device Per Unit

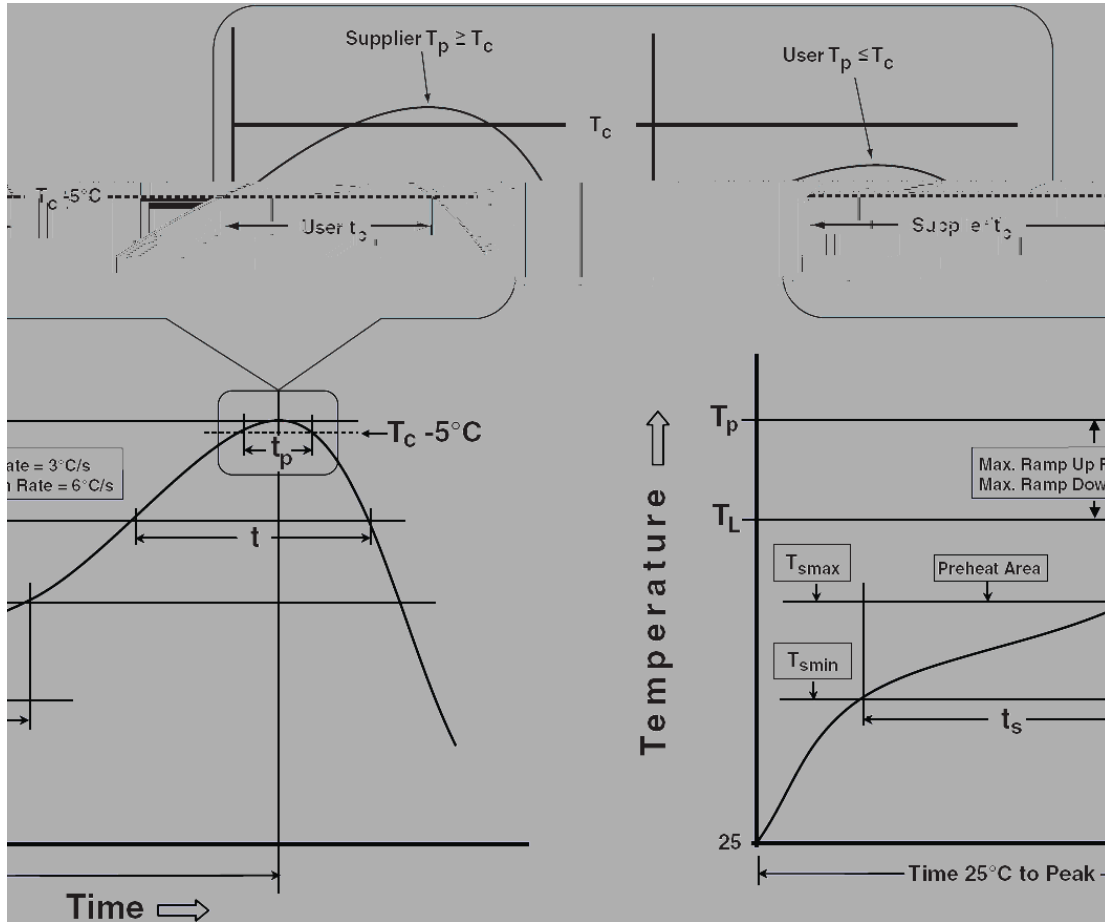
Package Type	Unit	Quantity
TO-3PM-3S	Tube	50

## Package Information

### TO-3PM-3S



### Classification Profile



### Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
<b>Preheat &amp; Soak</b>		
Temperature min ( $T_{smin}$ )	100 °C	150 °C
Temperature max ( $T_{smax}$ )	150 °C	200 °C
Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )	60-120 seconds	60-120 seconds
Average ramp-up rate ( $T_{smax}$ to $T_p$ )	3 °C/second max.	3°C/second max.
Liquidous temperature ( $T_L$ )	183 °C	217 °C
Time at liquidous ( $t_L$ )	60-150 seconds	60-150 seconds
Peak package body Temperature ( $T_p$ )*	See Classification Temp in table 1	See Classification Temp in table 2
Time ( $t_p$ )** within 5°C of the specified classification temperature ( $T_c$ )	20** seconds	30** seconds
Average ramp-down rate ( $T_p$ to $T_{smax}$ )	6 °C/second max.	6 °C/second max.
Time 25°C to peak temperature	6 minutes max.	8 minutes max.
* Tolerance for peak profile Temperature ( $T_p$ ) is defined as a supplier minimum and a user maximum.		
** Tolerance for time at peak profile temperature ( $t_p$ ) is defined as a supplier minimum and a user maximum.		

# HY3215P/M/B/PS/PM

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Table 2. Pb-free Process – Classification Temperatures (Tc)

<b>Package Thickness</b>	<b>Volume mm<sup>3</sup> &lt;350</b>	<b>Volume mm<sup>3</sup> 350-2000</b>	<b>Volume mm<sup>3</sup> &gt;2000</b>
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