



# DUL1504 – 400V, 15A

August 2009

Preliminary  
**Mintech**

HIGH EFFICIENCY, TEMPERATURE INDEPENDENT GaAs RECTIFIER DIODE

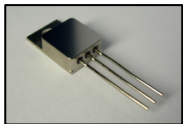
## General Description

The DUL1504 is a GaAs P-I-N Rectifier. It uses a patented liquid phase epitaxy (LPE) construction to provide temperature performance above current Silicon, Silicon Carbide and Gallium Nitride products of a similar specification. The device is able to function stably well above the maximum  $T_j$  of more traditional diodes of this type while maintaining parity of performance in terms of key parameters such as recovery time and forward voltage.

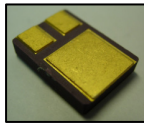
## Features

- High maximum junction temperature; up to +260°C vs. +175°C for silicon diodes
- Lower and **temperature independent** dynamic recovery characteristics over the full specified temperature range
- Lower leakage current at all operating temperatures
- Very low capacitance

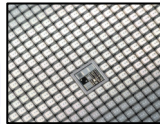
## Package Types



TO-257



TO-276AB (SMD)



BARE DIE

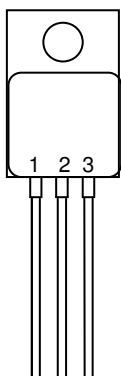
## Applications

- High temperature electronics
- Power Modules
- Hybrid circuits

## Thermal Characteristics

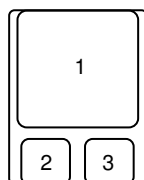
SYMBOL	PARAMETER	PACKAGE	RATINGS	UNITS
$R_{\theta JC}$	MAXIMUM THERMAL RESISTANCE, JUNCTION TO CASE	TO-276AI	3.51	°C/W
$R_{\theta JC}$	MAXIMUM THERMAL RESISTANCE, JUNCTION TO CASE	TO-257AIN	1.45	°C/W
$R_{\theta JC}$	MAXIMUM THERMAL RESISTANCE, JUNCTION TO CASE	TO-276AB	1.24	°C/W

TO-257AI / TO-257AIN



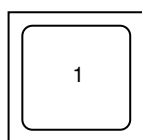
- 1 CATHODE
- 2 ANODE
- 3 CATHODE

TO-276AB



1. ANODE
2. COMMON CATHODE
3. COMMON CATHODE

BARE DIE (3.1mm<sup>2</sup>)



1. CATHODE
2. ANODE (DIE BACKSIDE)

ORDERING PART #	PACKAGE	TEMP RANGE
DUL1504AL	TO-257AI	-65 TO 260 °C
DUL1504ALN	TO-257AIN	-65 TO 260 °C
DUL1504S	TO-276AB	-65 TO 260 °C
DUL1504-AG	BARE DIE	-65 TO 260 °C
DUL1504-GG	BARE DIE	-65 TO 260 °C

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 USA : [ussales@mintech.co.uk](mailto:ussales@mintech.co.uk)  
 China: [chinasales@mintech.co.uk](mailto:chinasales@mintech.co.uk)

## Absolute Maximum Ratings

SYMBOL	PARAMETER	RATINGS	UNITS
$V_{RRM}$	PEAK REPETITIVE REVERSE VOLTAGE	400	V
$V_{RWM}$	WORKING PEAK REPETITIVE REVERSE VOLTAGE	400	V
$V_R$	DC BLOCKING VOLTAGE	400	V
$I_{F(AV)}$	AVERAGE RECTIFIED FORWARD CURRENT @ 260°C	15	A
$I_{FSM}$	NON-REPETITIVE PEAK SURGE CURRENT 60Hz SINGLE HALF-SINE WAVE	150	A
$T_J, T_{STG}$	OPERATING AND STORAGE TEMPERATURE RANGE	-65 to +260	°C

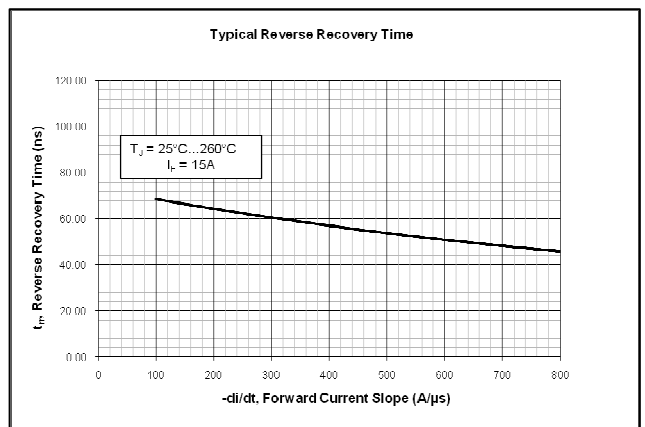
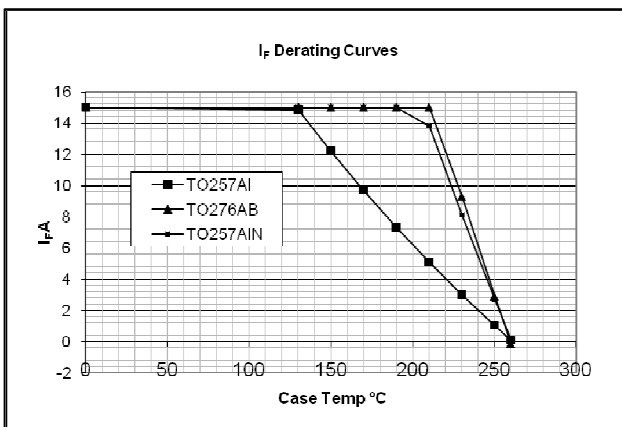
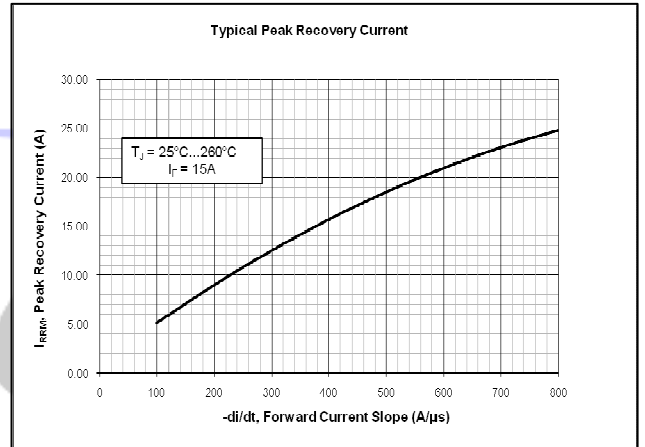
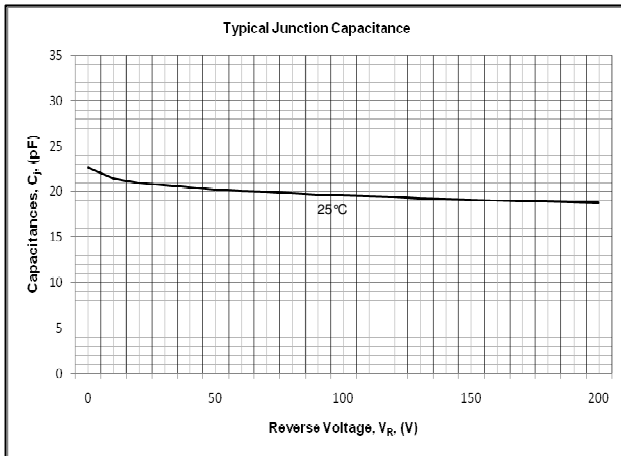
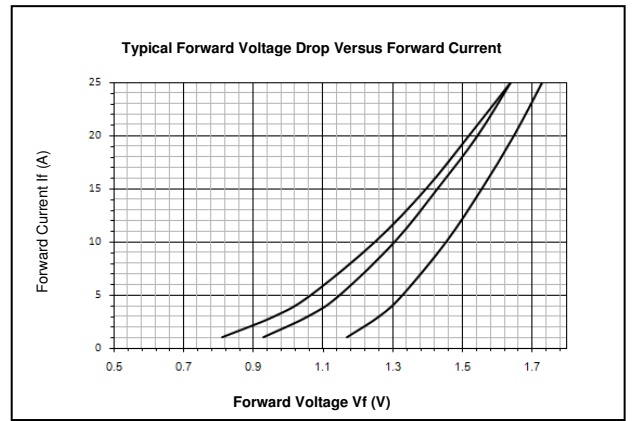
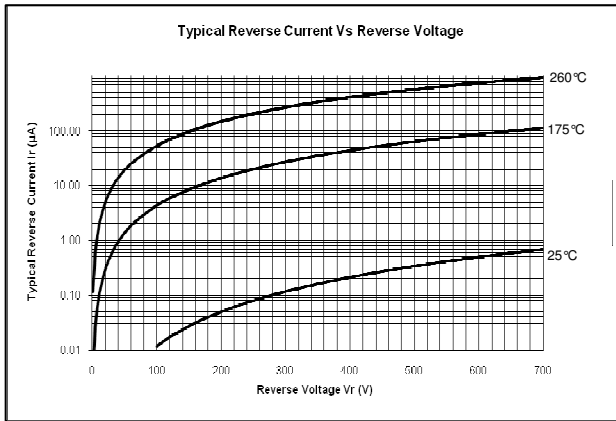
## Electrical Characteristics

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS
$V_{FM1}$	$I_F=15A$ $T_C = 25^\circ C$ $T_C = 175^\circ C$ $T_C = 260^\circ C$	-	1.55 1.45 1.42	1.60 1.50 1.45	V
$I_{RM1}$	$V_R=400V$ $T_C = 25^\circ C$ $T_C = 175^\circ C$ $T_C = 260^\circ C$	-	0.40 125 1000	1 130 1100	$\mu A$
$t_{RR}$	$I_F=1A, di/dt = 200 A/\mu s, V_R=30V$ $T_C = 25^\circ C$ $T_C = 175^\circ C$ $T_C = 260^\circ C$	-	30 30 30	40 40 40	ns
$t_{RR}$ $I_{RR}$ $Q_{RR}$	$I_F=15A, di/dt = 200 A/\mu s, V_R=200V$ $T_C = 25^\circ C$	-	65 9 300	75 11 370	ns A nC
$t_{RR}$ $I_{RR}$ $Q_{RR}$	$I_F=15A, di/dt = 200 A/\mu A, V_R=200V$ $T_C = 175^\circ C$	-	65 9 300	75 11 370	ns A nC
$t_{RR}$ $I_{RR}$ $Q_{RR}$	$I_F=15A, di/dt = 200 A/\mu A, V_R=200V$ $T_C = 260^\circ C$	-	65 9 300	75 11 370	ns A nC
$C_J$	$T_J= 25^\circ C, f = 1MHz, V_R = 200V$	-	18	22	pF
$W_{AVL}$	AVALANCHE ENERGY ( $L=2Mh$ )	-	10	-	mJ

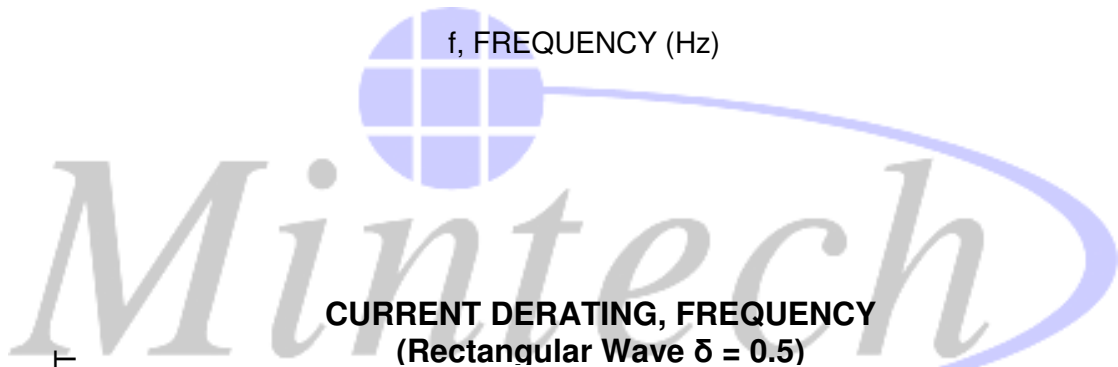
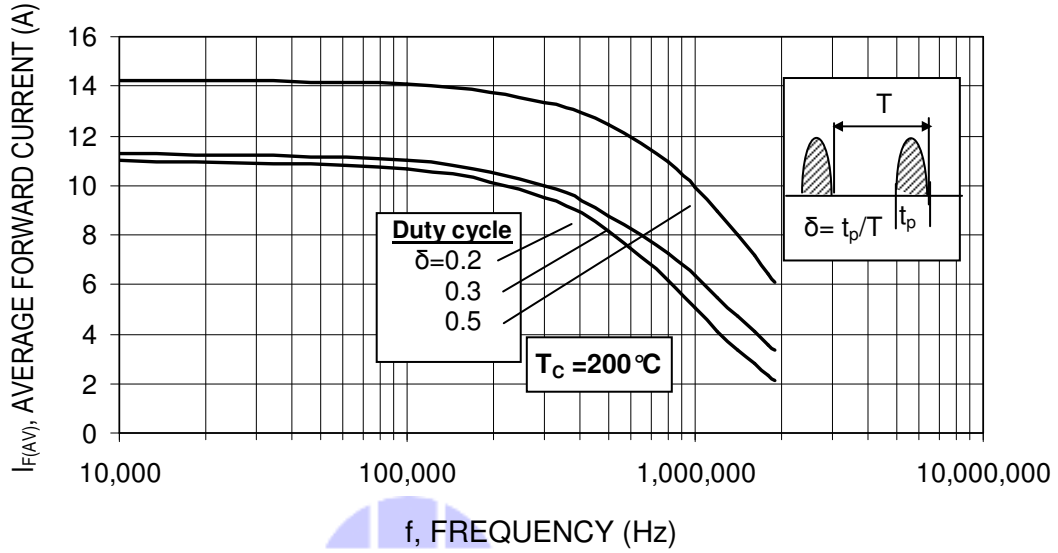
**Notes:**

1: Pulse: Test Pulse width = 300 $\mu s$ , Duty Cycle = 2%

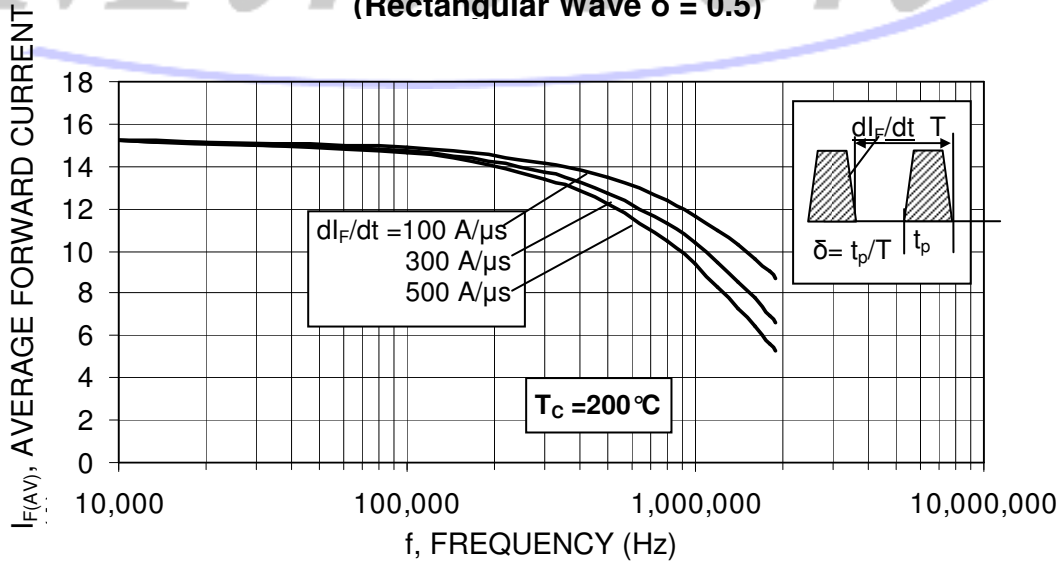
# Typical Performance Characteristics



### CURRENT DERATING, FREQUENCY (Sinusoidal Wave)

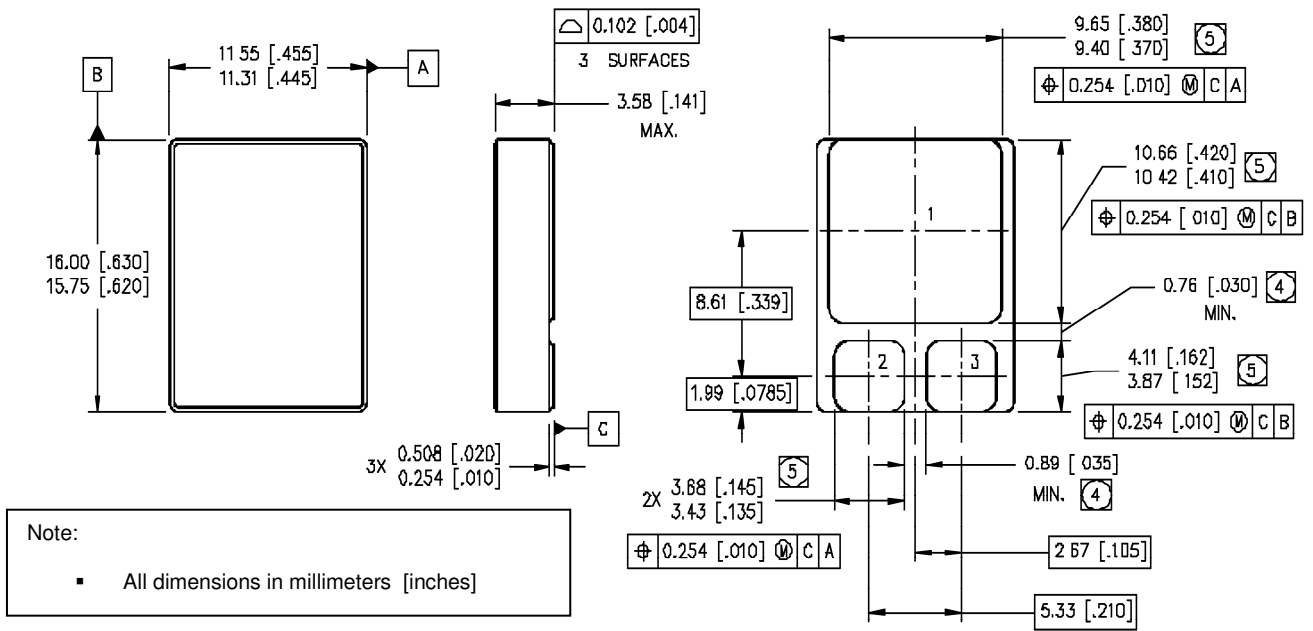
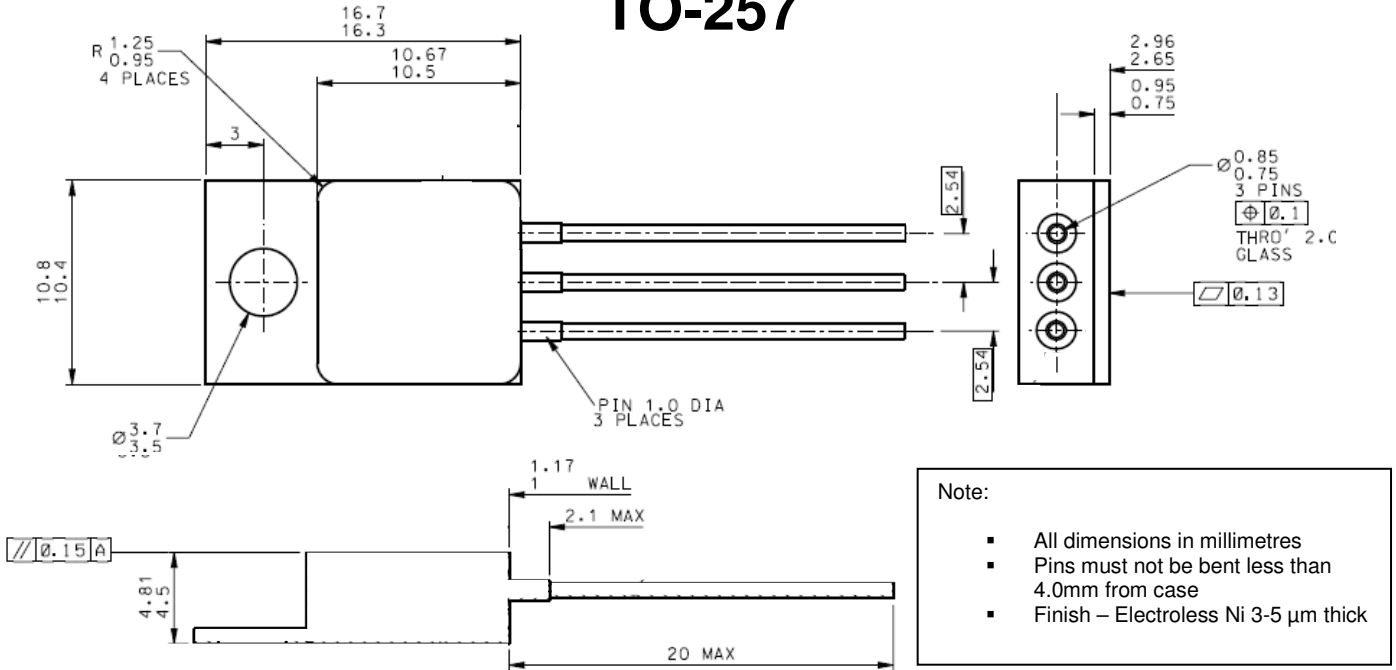


### CURRENT DERATING, FREQUENCY (Rectangular Wave $\delta = 0.5$ )



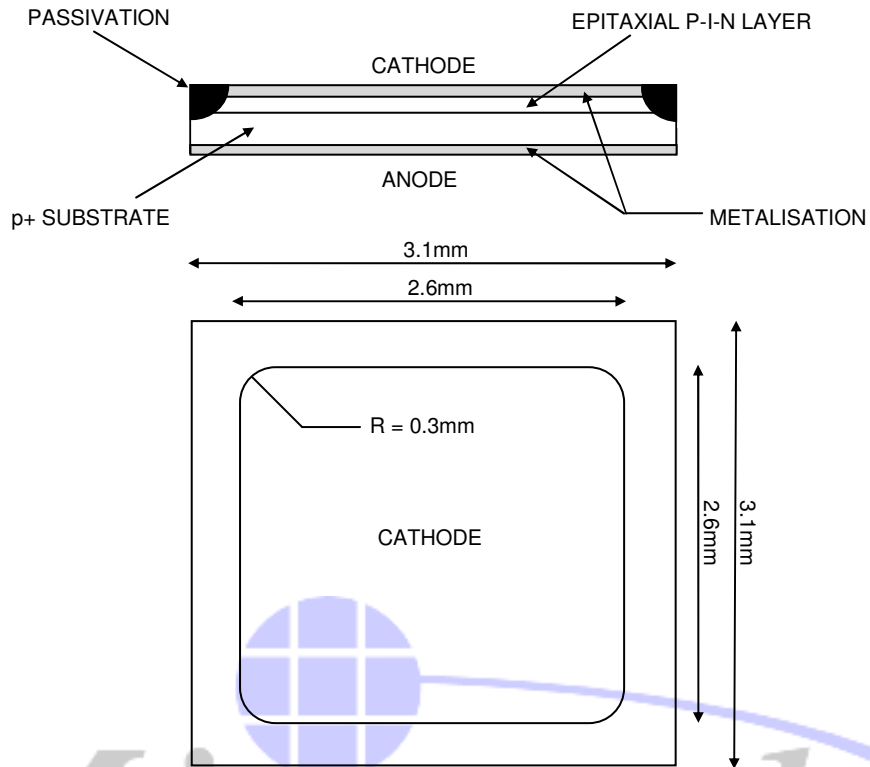
**Mechanical Dimensions**

**TO-257**



**Mechanical Dimensions**

**Bare Die**



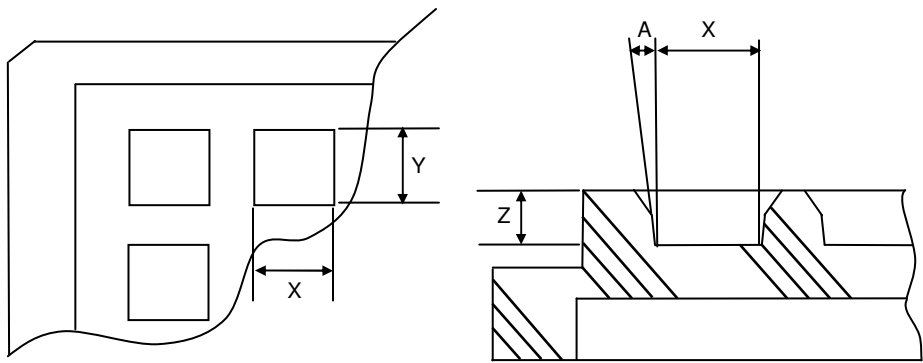
DIMENSIONS	3.1mm x 3.1mm	THICKNESS 400µm ± 20µm
Note: For custom thicknesses please contact us		

TOP METAL	Al OR Au (See order code below)
BACK METAL	Au

DUL1504-AG	Al TOPSIDE Au BACKSIDE
DUL1504-GG	Au TOPSIDE Au BACKSIDE

**Waffle Pack Dimensions**

Note: For other supply formats please contact us



<b>POCKET DETAILS</b>	
X = 3.20mm ±0.05mm	pocket size
Y = 3.20mm ±0.05mm	pocket size
Z = 1.19mm ±0.08mm	pocket depth
A = 5° ±1/2°	pocket draft angle
No Cross Slots	
Array = 10 X 10 (100)	
<b>OVERALL TRAY SIZE</b>	
Size = 50.80mm ±0.10mm	
Height = 3.96mm +0.05mm -0.08mm	
Flatness = 0.10mm	

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The logo features a stylized blue globe icon above the word "Mintech" in a large, italicized, serif font. A blue swoosh underline is positioned below the text.