ATECOM

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Company Profile

Atecom Technology Co., Ltd.

is the manufacturer and supplier of semiconductor materials established at Taipei of Taiwan in 1998.

We manufacture and cooperate with our partners for the various crystals on Semiconductor and Compound materials like Silicon ingots/wafers, Epitaxial wafers, Solar wafers, Sapphire, GaAs, SiC, GaN, InP and Ge wafer for applications to Optoelectronics, MEMS, LED, Power devices, Solar modules and IC's.

In the meantime, we keep expanding our product lines to the field of Sputtering Targets, Aluminium oxide, Germanium tetrachloride (GeCl4) materials in order to provide more services and choices to our customers.

Business Product lines

Semiconductor

Silicon Monocrystal Ingot--1
Silicon Wafer--2
Silicon Epitaxial Wafer---3
Processing Wafer – Schottky---4
Processing Wafer – GPP---5
SOI Wafer---6

Compound

Sapphire Wafer---7
GaAs Wafer---8
GaAs Epitaxial Wafer---9
SiC Wafer---10
SiC Epitaxial Wafer--11
SiC Chip/Diode--12
GaN Wafer – Free Standing---13
GaN Wafer – Template--14
GaN Epitaxial Wafer---15
GaN Chip/Diode--16
AlN Wafer---17
InP Wafer---18
Germanium Wafer---19
LN/LT Wafer---20
LED Wafer – AlGaInP Wafer/Chip---21
LED Wafer – GaN Wafer/Chip--22
Target – Deposition Materials--23
Powder - Al_2O_3 & SiO_2---24

New Energy

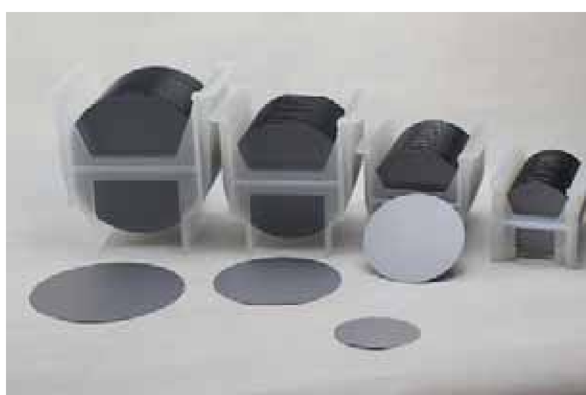
Multi Solar Wafer---25
Mono Solar Wafer--26
Mono PERC Solar Cell---27
Solar Modules---28
Solar Glass---29
Junction Box--30
Silver Paste for Multi--31
Silver Paste for Mono PERC---32
Aluminum Solar Panel---33

Silicon Monocrystal Ingot

Product Name	Silicon Ingot				Unit
Growth Method	CZ	MCZ	GDFZ	NTD	
Diameter*	50.8 ~ 200				mm
Diameter Tolerance	± 0.5				mm
Crystal Orientation	<111> / <100> / <110>				degree
Type / Dopant	N: Arsenic / Antimony / Phosphorus / Red Phosphorus				
	P: Boron				
Resistivity	0.001 ~ 300	1 ~ 20,000	30 ~ 800		Ω.cm
* Other customized specifications are welcome					

Silicon Wafer

Product Name	Silicon Wafer						Unit
Diameter (mm)	50.8	76.2	100	125	150	200	mm
Growth Method	CZ / MCZ / GDFZ / NTD						
Type／Dopant	N: Arsenic / Antimony / Phosphorus/ Red Phosphorus						
	P: Boron						
Resistivity	CZ / MCZ: 0.001 ~ 300						Ω.cm
	GDFZ: 1 ~ 20,000						
	NTD: 30 ~ 800						
Thickness*	381	381	525	525	675	725	μm
Thickness Tolerance*	Typical ± 25						μm
TTV*	≤ 10						μm
Bow*	≤ 25	≤ 30	≤ 30	≤ 30	≤ 30	≤ 40	μm
* Other surface conditions & customized specifications are welcome							
* Backside Seal LTO & Poly both are available							
* Other unmentioned parameters are per Semi Standard							



Epitaxial Wafer

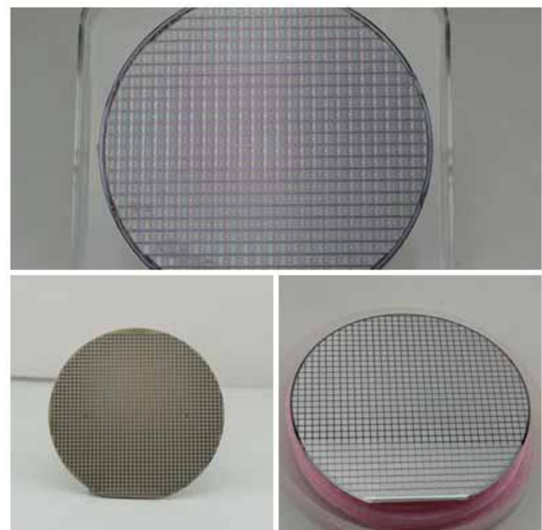
Product Name	Silicon Epitaxial Wafer					
Characteristics	**Parameters**					**Test Method**
Dopant	Boron / Phosphorus / Arsenic					
Orientation	<100> / <111>					
Resistivity	Epi Reactor	Diameter	Type	Epi resistivity	Uniformity	ASTM F723 F1392
	Batch	100mm	P/P^{++}; N/N^{+} ; N/N^{++} ; $N/N^{+}/N^{++}$; $N/P/P$; $P/N/N^{+}$	$4x10^{-3}$ $(B:1x10^{-2})^{-3}$ Ω.cm	≤ ±6%	
		125mm				
		150mm		3-30 Ω.cm	≤ ±6%	
		200mm		> 30 Ω.cm	≤ ±6%	
	Single	150mm	P/P^{++}; N/N^{++}; $N/N^{+}/N^{++}$	0.3-3 ohm.cm	≤ ±6%	
		200mm		3-30 ohm.cm	≤ ±6%	
Thickness	Epi Reactor	Diameter	Type	Epi thickness	Uniformity	FTIR ASTM F95
	Batch	100mm	P/P^{++}; N/N^{+} ; N/N^{++}; $N/N^{+}/N^{++}$; $N/P/P$; $P/N/N^{+}$	3-100 μm	≤±6%	
		125mm				
		150mm				
		200mm				
	Single	150mm	P/P^{++}; N/N^{+} ; $N/N^{+}/N^{++}$	0.1-20 μm	≤ ±6%	
		200mm				
Stacking Faults	≤ 10 ea/cm^{2}					ASTM F1810
Slip	≤ 5 lines, total length <1/2 diameter					ASTM F1725 F1726
Surface Condition	Free of Haze, Scratches, Craters, Orange Peel, Cracks, Crow's Feet, Edge Chips,Foreign Matter, Back Surface Contamination					ASTM F523
Edge Crown	Projection above wafer surface not to exceed 1/3 of Epi layer thickness					
Point Defects	SEMI Standard					ASTM F523

Processing – Schottky Chip/Diode

Product Name	Schottky Barrier Wafer			Unit
Parameter	SB Series	MBR Series	TBR Series	
V_{RRM} (Max)	20 ~ 60	35 ~ 100	45 ~ 200	V
I_F (Max)	1.0 ~ 5.0	7.0 ~ 16	1.0 ~ 30	A
V_{FM} (Max)	0.48 ~ 0.70	0.63 ~ 0.84	0.42 ~ 0.70	V
I_{RRM} (Max) $V_{RM}=V_{RRM}$	0.5	0.1 ~ 1.0	0.1 ~ 1.0	mA
Package	DO-41 / DO-15 / DO-201AD	DO - 220AC	DO-220AB	
* Other customized specifications are welcome				

Processing – GPP Chip/Diode

Product Name	GPP Wafer			Unit
Parameter	SG010-15	SG020-60	SG030-250	
Size	40 ~ 60	65 ~ 98	105 ~ 180	mil
I_F	1.0 ~ 1.5	2.0 ~ 6.0	8.0 ~ 25	A
I_{FSM}	15 ~ 55	70 ~ 175	200 ~ 600	A
I_R (VR=VRRM)	2.0	2.0	2.0	μA
V_{RRM}	200 ~ 1400			V
Metal	Ni / Au			
Junction Temp.	150			°C
* Other customized specifications are welcome				



SOI Wafer

Product Name	SOI Wafer				Unit
Diameter	100	125	150	200	mm
Substrate Specification					
Growth Method	CZ / MCZ / FZ				
Orientation	<100> / <111> / <110>				degree
Dopant	P: Boron				
	N: Arsenic / Antimony / Phosphorus/ Red Phosphorus				
Resistivity*	0.001 ~ 20000				Ω.cm
Device Layer					
Thickness*	≥ 1.5		0.1~ 300		μm
Buried Oxide Layer					
Thickness*	0.02 ~ 5.0				μm
Handle Layer					
Thickness*	200 ~ 1250		500 ~ 750		μm
Surface	Lapped / Etched / Polished				
* Other customized specifications are welcome					

Sapphire Wafer

Product Name	Sapphire Wafer			Unit
Diameter	50.8	100	150	mm
Thickness*	430± 15	650± 15	1300± 25	µm
Surface Orientation*	C-Plane (0001) tilted M-axis 0.2°± 0.1°			degree
Primary Flat	A-Axis (11-20) ± 0.2°			degree
Orientation Length	16 ± 0.5	30 ± 1.0	49.0 ± 1..0	mm
TTV	≤ 5	≤ 10	≤ 15	µm
Bow	0~-10	0~-10	0~-20	µm
Warp	≤ 10	≤ 15	≤ 30	µm
Roughness Front Side	≤ 0.2	≤ 0.2	≤ 0.2	nm
Roughness Back Side	0.8 ≤ Ra ≤ 1.2			µm
Wafer Edge*	R-Type / T-Type			
Laser Mark*	On Front Side Near Primary Flat			
* Other surface conditions & customized specifications are welcome				

GaAs Wafer

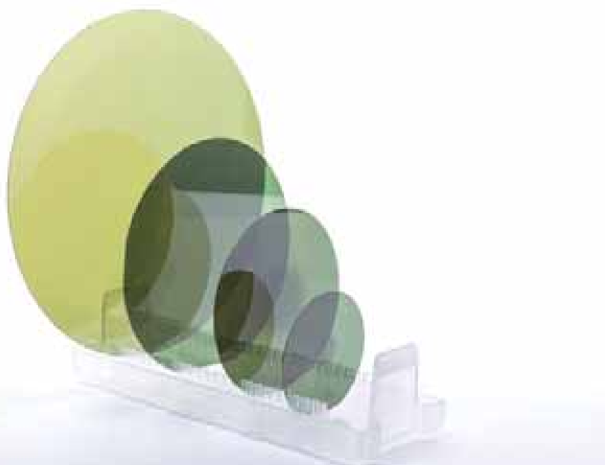
Product Name	GaAs Wafer			Unit
Diameter	50.8 ~ 150			mm
Dopant	N / Si	P / Zn	SI / Carbon	
Thickness*	(350 ~ 675) ± 25			µm
Surface Orientation*	On-axis : (100) ± 0.5º Off-axis:2º / 6º /15º off toward<111> ± 0.5º			degree
Hall Mobility*	≥1000 ~ 2500	≥50 ~ 120	≥4000~5000	$cm^2/V.S$
Etch Pit Density*	≤100 ~ 5000	≤ 3000 ~ 5000	≤ 1500 ~ 5000	cm^{-2}
Carrier Concentration*	$(0.8 \sim 4.0) \times 10^{18}$	$(0.5 \sim 5.0) \times 10^{19}$	$\leq 1 \times 10^{8}$	cm^{-3}
TTV(DSP)*	≤ 4			µm
TTV(SSP)*	≤ 10			µm
Warp*	≤ 15			µm
Front Side	Etched or Polished			
Back Side	Etched or Polished			
* Other surface conditions & customized specifications are welcome				

GaAs Epitaxial Wafer

Product Name	GaAs Epitaxial Wafer (LD)				Unit
Application	Laser Diodes				
Wavelength	680 ~ 850	739~808	640~690	980~1080	nm
Epitaxial Structure	$Al_{(x)}Ga_{(1-x)}As/GaAs$	GaAsP/GaAs	AlGaInP/InGaP/GaAS	InGaAs/AlGaAs/GaAs	
Thickness Uniformity	± 1.5				%
Carrier Conc. Uniformity	± 10				%
N-doping Limit	$\leq 5 \times 10^{18}$				cm^{-3}
P-doping Limit	$\geq 7 \times 10^{19}$				cm^{-3}
Carrier Mobility at $N=2x10^{17}$	≥ 3000				$cm^2/V.S$
Composition Uniformity	x = 0.497~0.503				
Substrate Diameter	2" ~ 4"				
* Other customized specifications are welcome					

SiC Wafer

Product Name	SiC Wafer				Unit
Diameter	50.8	76.2	100	150	mm
Type	4H- N / 4H-SI / 6H-N / 6H-SI				
Resistivity	4H-N: 0.015 ~ 0.028 ; 4H/6H-SI: >1E5 ; 6H-N: 0.02 ~ 0.1				Ω.cm
Thickness*	(330 ~ 500) ± 25				μm
Orientation*	On-axis: <0001> ± 0.5° Off-axis: 4°± 0.5°off toward (11-20)				degree
Primary Flat*	(10-10) ± 5.0°				degree
Secondary Flat	Silicon Face: 90°CW from Primary ± 5.0°			None	degree
TTV*	≤15				μm
Bow*	≤25			≤40	μm
Warp*	≤25	≤35	≤40	≤60	μm
Micropipe Density	Zero:≤1 / Production:≤5 / Research:≤15 / Dummy:≤50				cm^{-2}
Roughness	Polished (Ra≤1)				nm
	CMP (Ra≤0.5)				
* Other customized specifications are welcome					



SiC Epitaxial Wafer

Product Name	SiC / SiC Wafer		Unit
Diameter	50.8 ~ 150		mm
Conductivity	N - Type	P -Type	
Dopant	Nitrogen	Aluminum	
Carrier Concentration	$9 \times 10^{14} \sim 1 \times 10^{19}$	$9 \times 10^{14} \sim 1 \times 10^{19}$	cm^{-3}
Tolerance	± 15	± 50	%
Uniformity	≤ 10	≤ 20	%
Thickness*	0.2 ~ 50		µm
Tolerance	± 10		%
Uniformity	≤ 10		%
Defects	< 1		cm^{-2}
Roughness (20µmX20µm)	≤ 0.5		nm
Scratches	<1 x wafer diameter		ea/mm
Usable Area	≥90		%

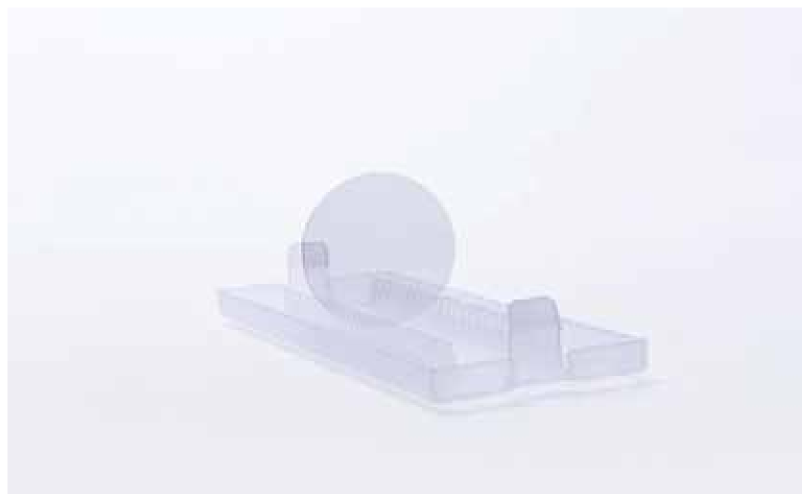
* Other customized specifications are welcome

SiC Chip/Diode

Product Name	SiC Schottky Chip/Diode				Unit
$V_{R\ (Max)}$	650	1200	1700	3300	V
$I_{F\ (Max)}$	3 ~ 100	2 ~ 50	5 ~ 15	0.6 ~ 50	A
$V_{F\ (Max)}$	≤ 1.7 ~ 2.3				V
$Tj_{(Max)}$	-55 ~175				°C
Package*	TO-220 / TO-247 / TO-252 / TO-263				
* Other customized specifications are welcome					

GaN Wafer – Free Standing

Product Name	GaN-FS			Unit
Dimension*	(5.0~10.0) x (10.0~20.0) ; ± 0.2			mm^2
	50.8 ± 1.0			mm
Type/Dopant	N / Ge	N / Undoped	SI / Fe	
Resistivity	< 0.05	< 0.5	$>10^6$	Ω.cm
Orientation*	C-plane (0001) off toward M-Axis 0.35°± 0.15°			degree
Thickness*	350 ± 25			μm
Dislocation Density	$(0.5\sim3) \times 10^6$	$(0.1\sim3) \times 10^6$	$(0.1\sim3) \times 10^6$	cm^{-2}
TTV*	≤ 15			μm
Bow*	≤ 20			μm
Front Surface	Polished (Ra<0.2nm)			
Back Surface	Fine ground			
Useable Surface Area	> 90			%
* Other conditions & customized specifications are welcome				



GaN Wafer – Template

Product Name	GaN-Temp			Unit
Diameter	50.8 ± 0.1		100 ± 0.1	mm
Orientation	C-axis(0001) ± 0.5°			degree
Type	P-type (Mg-doped)	N-type (Si-doped)	N-type (Undoped)	
Resistivity	~10	< 0.5	< 0.05	Ω.cm
Thickness	4	4 or 20		μm
Carrier Concentration	> 6×10^{16}	< 5×10^{17}	> 1×10^{18}	cm^{-3}
Mobility	~10	~300	~200	$cm^2/V.s$
Dislocation Density	< 5×10^{8}			cm^{-2}
Substrate Structure	GaN on Sapphire (0001) (SSP or DSP)			
Useable Surface Area	> 90			%

GaN Epitaxial Wafer

Product Name	GaN EPI Wafers				Unit
Substrate	Silicon	HR Silicon	SiC	Sapphire	
Diameter	50.8 ~ 200	150 ~ 200	50.8 ~100		mm
Epi-layer thickness	>3	~2	0.5~3		µm
Crystalline AlGaN/GaN HEMT	<800" (002) & <2000" (102)	<700" (002) & <1350" (102)	<250" (2µm GaN)	<400" (2um GaN)	-
Composition AlGaN/GaN HEMT	$Al_xGa_{1-x}N$ ($0<x<0.5$)				
AlGaN barrier thickness	2~50				nm
AlN spacer*	0.2-2				nm
Surface morphology ($5x5µm^2$)	RMS<0.5				nm
Bow	<50				µm
2DEG	>9E12(25nm $Al_{0.25}GaN$)		>8E12 (25nm Al0.25GaN)		$/cm^2$
Electron mobility (cm^2/Vs)	>1500	>1800	>2000	>1500	cm^2/Vs
Sheet resistance	<400(25nm $Al_{0.25}GaN$)				Ω.cm
Buffer resistivity	$>10^5$				Ω.cm
* Other customized specifications are welcome					

GaN Chip/Diode

Product Name	GaN Chip/Diode				Unit
Parameter	FET		SBD		
$V_{R\ (Max)}$	200	600	200	600	V
$I_{F\ (Max)}$	20	10	20	10	A
$I_{R(Max)}$	≤ 0.1		≤ 1.0		μA
$R_{DS}(on)$	0.05	0.15	-		Ω
$V_{F(Max)}$	-		≤ 1.5		V
$Tj_{(Max)}$	-55 ~175				°C
* Other customized specifications are welcome					

AlN Wafer

Product Name	AlN Wafer	Unit
Diameter	50.8 ± 0.1	mm
Type	Semi-Insulating	
Thickness	4~5	μm
Orientation	C-axis(0001) ± 1.0°	degree
Crystalline	XRD FWHM of (0002) < 350	arcsec
	XRD FWHM of (10-12) < 450 arcsec	
Edge Exclusion	< 2	mm
Surface Roughness (10 μm x 10 μm)	Ra < 5	nm
Substrate	Sapphire (Single side polished)	

InP Wafer

Product Name	InP Wafer			Unit
Diameter	50.8 ~ 100			mm
Orientation*	(100) ± 0.5°			degree
Thickness*	(350~625) ± 25			μm
Type/Dopant	N / S or Sn	P / Zn	N / Undoped	
Carrier Concentration	$(0.8\text{-}8) \times 10^{18}$		$(1\text{-}10) \times 10^{15}$	cm^{-3}
Mobility	$(1\text{-}2.5) \times 10^{3}$	50 ~ 100	$(3\text{-}5) \times 10^{3}$	cm^{2}/Vs
Etch Pitch Density	100 ~ 5000	≤ 500	≤ 5000	cm^{2}
TTV*	SSP : ≤ 15 DSP : ≤ 10			μm
Warp	≤ 15			μm
Surface	Etched or Polished			
* Other customized specifications are welcome				

Germanium Wafer

Product Name	Germanium Wafer		Unit
Diameter	50.8 ~ 150		mm
Dopant	P / Ga	N / As	
Resistivity	0.005 ~ 0.04	0.05 ~ 0.25	Ω.cm
Orientation*	(100) ± 0.5		degree
Thickness*	175 ± 25		μm
Etch Pit Density	≤ 300		cm^{-2}
TTV	≤ 10		μm
Warp	≤ 15		μm
Front Side Surface	Etched or Polished		
Back Side Surface	Etched or Polished		
Edge Profile	Round		
* Other customized specifications are welcome			

LN / LT Wafer

Product Name	Lithium Niobate $LiNbO_3$ (LN) Wafer LithumTantalate LiTaO3 (LT) Wafer			Unit
Diameter	76.2	100	150	mm
Orientation	LN: 64° Rot. Y-cut±0.2° / 127.86° Rot. Y-cut±0.2° / Y-cut±0.2° LT:36° Rot. Y-cut±0.2° / 42° Rot. Y-cut±0.2° / X-cut±0.2°			degree
Primary Flat	LN: Perpendicular to X ± 0.2° / Perpendicular to Z±0.2° LT:Perpendicular to X ± 0.2° / Perpendicular to 112.2° Y±0.2°			degree
Secondary Flat	LN: CW 180° / CW 225° / CW 270°±0.5° from Primary LT: CW 225° / CW 270° / CW 315°±0.5° from Primary			degree
Thickness*	(200~500) ± 20			μm
TTV	≤ 10			μm
Bow	≤ 25			μm
Front Surface	Ra ≤ 8			Å
Back Surface	LN: 0.2 ≤ Ra ≤ 0.7 LT:0.2 ≤ Ra ≤ 0.5 or 0.08 ≤ Ra ≤ 0.15			μm
Edge Beveling	Rounded			
Curie Temp.	LN: 1142 ± 3 LT:605 ± 3			℃
* Other surface conditions & customized specifications are welcome				

LED Wafer – AlGaInP Wafer/Chip

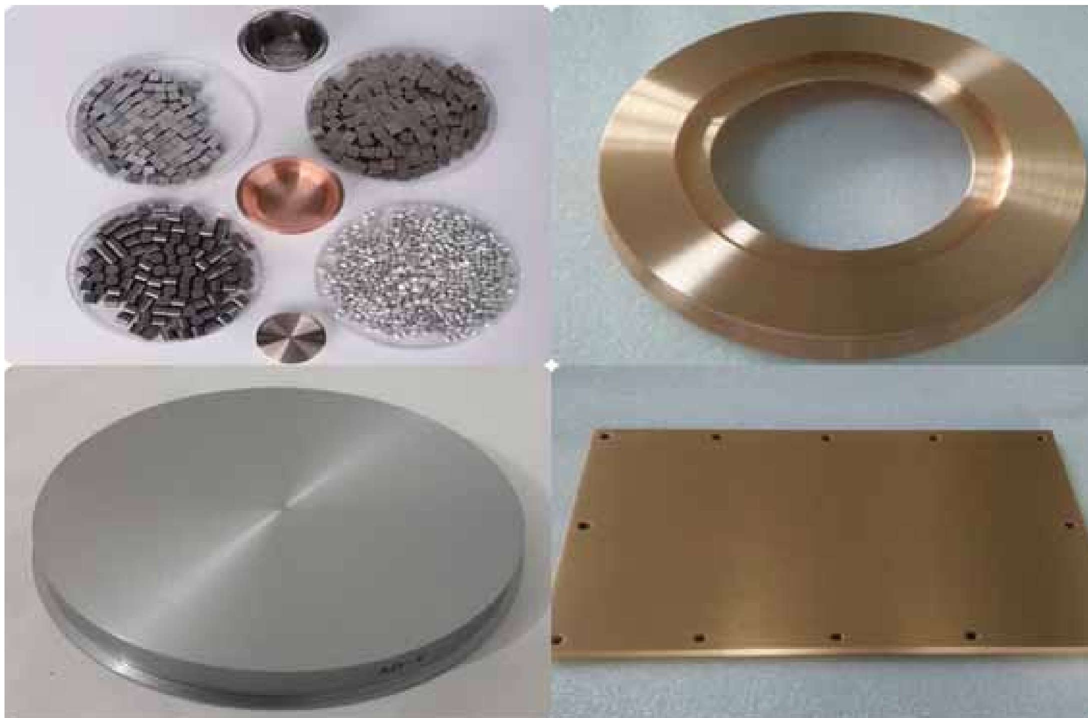
Product Name	AlGaInP LED Wafer / Chip				Unit
Color	Red: 615 ~ 645nm Yellow: 580 ~ 597nm Orange: 595 ~ 617nm			Yellow-Green: 565~575nm	
Size	6.5 ~ 12	8 ~ 14	24 ~ 40	6.5 ~ 12	mil
Polarity	Positive pole	Anti-pole	Anti-pole	Positive pole	
Brightness	10 ~ 300	175 ~ 700	2800 ~ 15000	10 ~ 120	mcd
Voltage	≤ 2.2	≤ 2.3	≤ 3.0	≤ 2.2	V
* Other customized specifications are welcome					

LED Wafer – GaN Wafer/Chip

Product Name	GaN LED Wafer / Chip			Unit
Color	Blue (For white light)	Blue	Green	
Wavelength	445 ~ 460	460 ~ 470	505 ~ 535	nm
Size*	8 ~ 40			mil
Brightness	52 ~ 72	3.7 ~ 5.9	3.5 ~ 5.5	mW
Voltage	≤ 3.0 ~ 3.5	≤ 2.8 ~ 3.2	≤ 2.8 ~ 3.1	V
* Other customized specifications are welcome				

Target – Deposition Materials

Deposition Materials	
Sputtering Targets	Pure Metal / Alloy / Oxide / Nitride / Sulfide / Fluoride / Carbide
Pure Metal	Al, Ti, Cr, Co, Cu, Zr, Zn, Sn, Mo, Ag, Au…
Alloy	TiAl, TiCu, TiSi, TiCr AlSi, NiCr, NiTi, NiV, NiFe…
Compound	ZnO, TiO2, ITO, AlN, BN, CdS,MgF2…
Evaporation Materials	Pure Metal / Compound
Pure Metal	Ti, Ni, Ag, Al, Cu
Compound	ZrO2, Ta2o5, Ga2O3, HfO2, Nb2O5…
PVD - Supplies	Crucible / Boat / Wire / Crystal
Crucible	W Crucible, Mo Crucible, Ta Crucible…
Boat	W Boat, Mo Boat, BN Boat…
Wire / Crystal	W Basket, Al Wire, Crystal
* Other customized Target materials are welcome	



Powder – Al_2O_3 & SiO_2

- **Boehmite Alumina Powder**
  - Formula: γ-AlO(OH)
  - Purity: up to 99.995%
- **Alumina Powder**
  - Formula: α-Al_2O_3 and γ-Al_2O_3
  - Purity: up to 99.995%
- **SiO_2 Powder**
  - Purity: up to 99.995%

Multi Solar Wafer

Product Name	Multi Solar Wafer		Unit
Parameter	M0	M2	
Diameter	156 x 156 ± 0.5	156.75 x 156.75 ± 0.5	mm^2
Diagonal	219.2±0.5	220±0.5	mm
Chamfering	0.5 ~ 1		mm
Square	90°±0.3°		degree
Type / Dopant	P / Boron		A
Resistivity	1 ~ 3		Ω.cm
Thickness	200±20		µm
Oxygen Concentration	$\leq 10 \times 10^{17}$		at/cm^3
Carbon Concentration	$\leq 7 \times 10^{17}$		at/cm^3
Lifetime	≥ 2		µs
TTV	≤ 30		µm
Warp	≤ 40		µm
Saw Mark	≤ 15		µm
Surface	As cut and cleaned		
* Other customized specifications are welcome			

Mono Solar Wafer

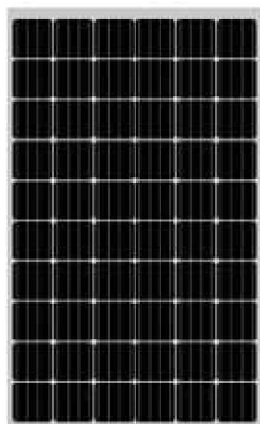
Product Name	Monocrystalline Silicon Solar Wafer					Unit
Parameter	M1	M2	M4	Thin Wafer	Square Wafer	
Diameter	205	210	211	160/205/210/211	219/220	mm
Flat Length	156*156	156.75*156.75	161.70*161.70	125 ~ 162	156 ~ 156.75	mm^2
Orientation	<100> ; <110>					degree
Resistivity	P-Type: 0.3 ~ 3.0 N-Type: 0.1 ~ 20					Ω.cm
Thickness	170 ~ 200	170 ~ 200	170 ~ 200	90 ~ 130	130 ~ 180	µm
Surface	As Cut & Cleaned					
* Other customized specifications are welcome						

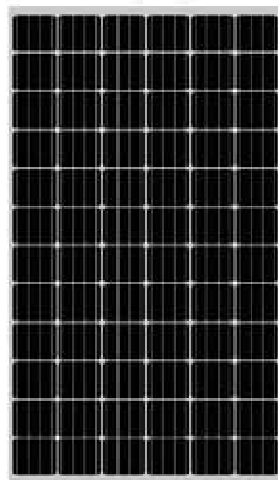
Mono PERC Solar Cell

Product Name	Monocrystalline PERC Solar Cell					Unit
Parameter	M2 - 4BB			M2 - 6BB	M4 - 5BB	
Dimension	156.75*156.75 ~ 210			156.75*156.75 ~ 210	161.8*161.8 ~ 211	mm^2
Efficiency	21.0	21.1	21.2	21.3	21.3	%
Power	5.13	5.15	5.18	5.2	5.51	W
Voc	0.661	0.662	0.663	0.664	0.663	V
Impp	9.663	9.670	9.702	9.690	10.298	A
Fill Factor	80.32%	80.45%	80.53%	80.82%	80.70%	%
Thickness	160 ~ 200					µm
* Other customized specifications are welcome						

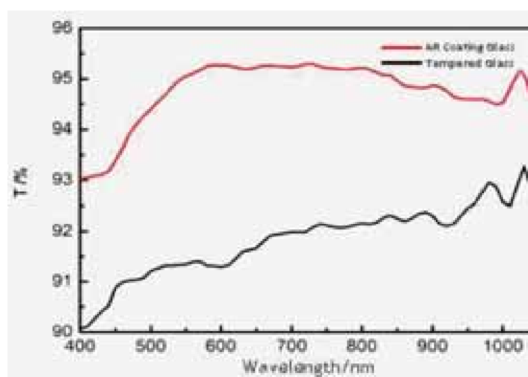
Solar Modules

Product Name	Solar Modules								
Cell Type	Number of Cells	Dimension (mm^3)	Pmax (W)	Tolerance (W)	Vmpp (V)	Impp (A)	Voc (V)	Isc (A)	Efficiency (%)
Mono	60	1650x992x40	265	0-+5	30.50	8.69	38.2	9.15	>16.30
	60	1650x992x40	270	0-+5	30.80	8.78	38.4	9.27	>16.60
	60	1650x992x40	275	0-+5	30.90	8.91	38.5	9.36	>16.90
	60	1650x992x40	280	0-+5	31.00	9.02	38.7	9.47	>17.20
	60	1650x992x40	285	0-+5	31.20	9.13	38.8	9.56	>17.50
	72	1965x992x46	325	0-+5	37.20	8.73	46.1	9.25	>16.90
	72	1965x992x46	330	0-+5	37.60	8.78	46.3	9.29	>17.10
	72	1965x992x46	335	0-+5	37.90	8.83	46.7	9.32	>17.4
Poly	60	1650x992x40	250	0-+5	30.00	8.34	37.40	8.88	>15.30
	60	1650x992x40	255	0-+5	30.30	8.42	37.60	8.96	>15.60
	60	1650x992x40	260	0-+5	30.60	8.50	37.80	9.04	>15.90
	60	1650x992x40	265	0-+5	30.90	8.58	38.00	9.12	>16.20
	60	1650x992x40	270	0-+5	31.20	8.66	38.20	9.20	>16.50
	72	1956x992x46	300	0-+5	35.80	8.40	44.50	8.95	>15.50
	72	1956x992x46	305	0-+5	36.10	8.45	44.80	9.00	>15.70
	72	1956x992x46	310	0-+5	36.50	8.50	45.10	9.05	>16.00
	72	1956x992x46	315	0-+5	36.90	8.55	45.40	9.10	>16.30
	72	1956x992x46	320	0-+5	37.30	8.60	45.70	9.15	>16.50





Solar Glass

Product Name	Solar Glass			Unit
Dimension(Max)	1950×2500 (Raw Plate)/ 1150×2500 (Tempered)			mm^2
Regular Dimension	1643×985 / 1634×984 / 1574×805 / 1634×986			mm^2
Optical Property				
Thickness	2.5	3.2	4.0	mm
Reflectance	7.6			%
Sun Light Transmitted	>91.6			%
Coated Transmitted	94.5			%
Mph's Scale (Scratch Harness)	5			
Knoop Harness Number Indenter Load-500g	470			
Poisson's Ratio	0.217			
Density	2.4872			g/cm^3
(Young's) Modulus of Elasticity	70.000			N/mm^2
Tensile Strength	25			N/mm^2
Specific Gravity	700-900			N/mm^2
Mechanical Strength	90			N/mm^2
Thermal Property				
Specific Heat	0.2			J/Kg.K
Calculated Themal Conductivity at 20°C	1.0W			W/mK
Softening Point	743.3			°C
Annealing Point	577			°C
Strain Point	537.4			°C
Expansion Co-Efficiency Linear In the Range of 20°C-300°C	8.64×10^{-6}			
Transmittance Curve Comparison				
Diagram				

Junction Box

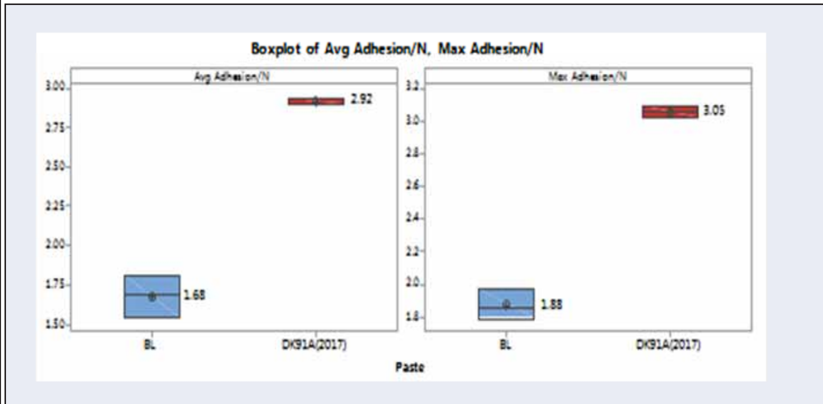
Product Name	Junction Box
Rated Voltage	1500V DC
Rated Current	15A
Rated Impluse Voltage	16000V
Ambient Temperature	-40℃~+85℃
Degree of protection	IP67
Contact Resistance	<13.0mΩ(1m) Accroding to the customer cable length is confirmed
Polarity of the connector	Socket=Pluus/Positive Plug=Minus / Negative
Type of Termintation	Welding
Contact Material	Copper, Ni-Plated
Insulation Material	PP0 V0150B
Flame Class	UL94-V0
TUV Rheinland	R50361173
Cable specification	4mm^2
Warning	Do not disconnect under load

Silver Paste for DWS Multi(incl. Black Silicon)

DK91A

Mass production data of DK91A on std multi

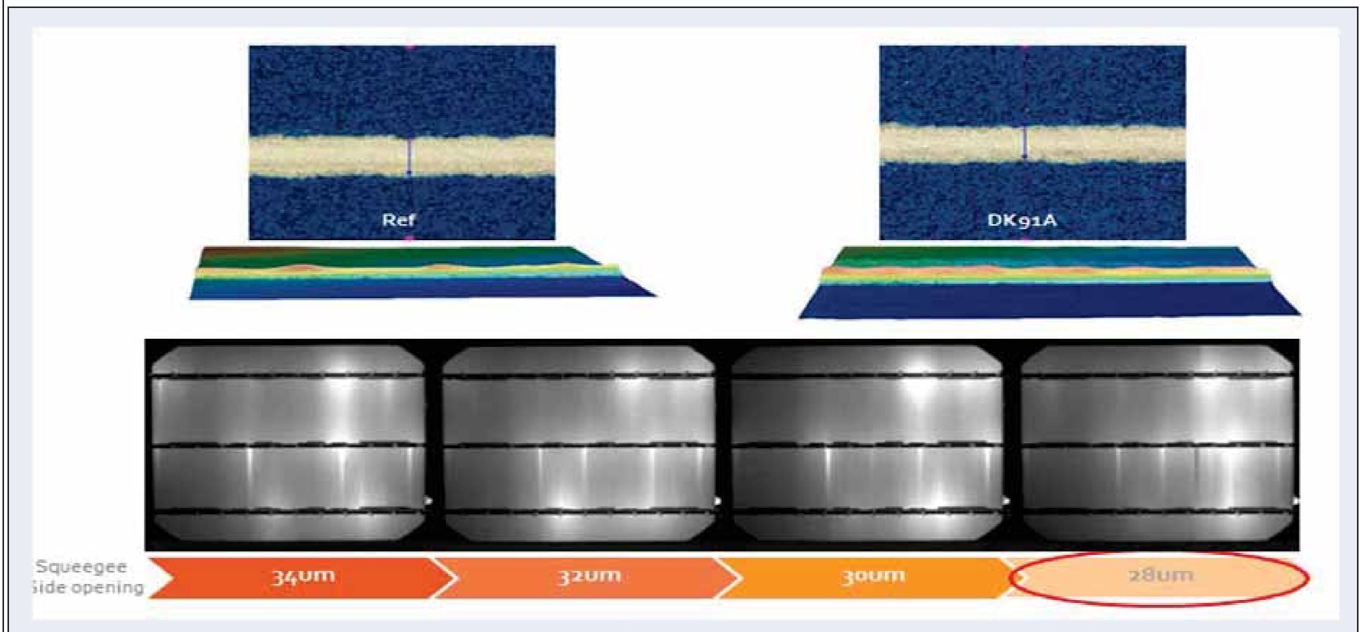
Paste	Uoc (mV)	Isc (A)	Rs (mOhm)	Rsh (Ohm)	FF (%)	Eff (%)	Qty(Pcs)
Ref	632.4	9.045	1.64	240	80.47	18.92%	1039
DK91A	632.6	9.064	1.71	241	80.59	18.99%	1128
Ref	635.1	9.087	1.57	191	80.08	19.00%	398
DK91A	635.4	9.109	1.5	160	80.26	19.08%	397
Ref	635.5	9.146	1.72	140	80.01	18.93%	4578
DK91A	636.0	9.160	1.54	132	80.35	19.04%	5895



1.Adhesion improved >1 N

2.Meet the strict requirement of DWS and 5BB

Compatible with standard multi



Silver Paste for Mono PERC(incl. Standard Mono)

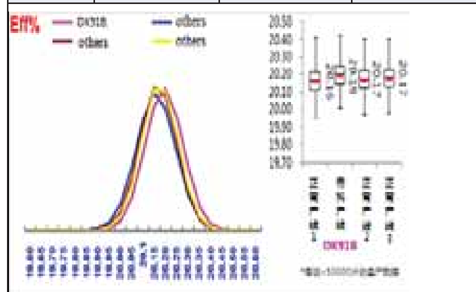
DK91B

Mass production data of DK91B on standard mono

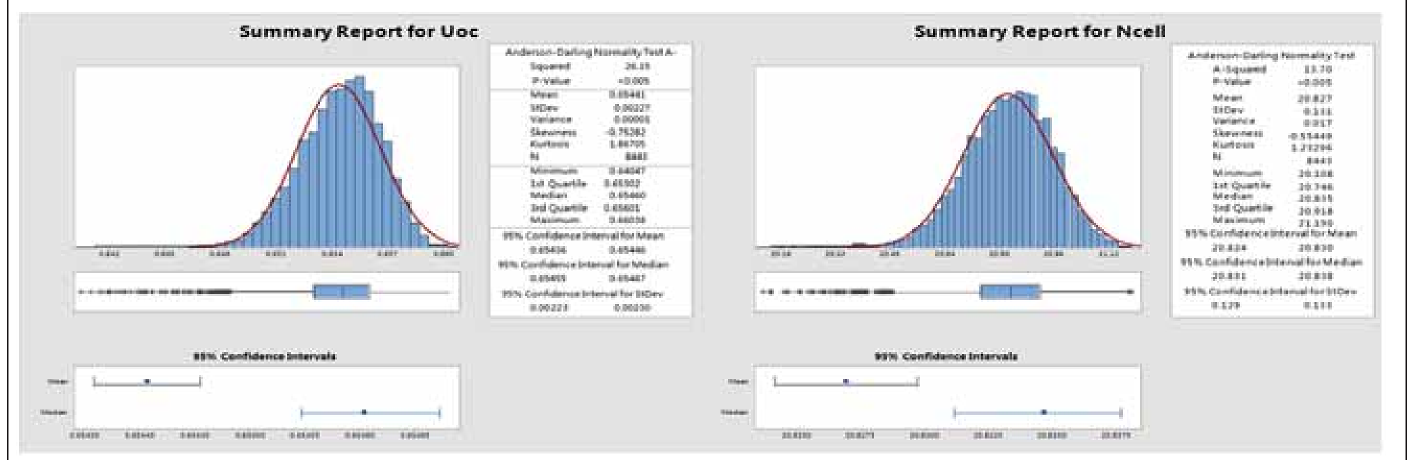
Paste	Uoc(mV)	Isc (A)	Rs (mOhm)	Rsh (Ohm)	FF (%)	Eff (%)
Ref	646.8	9.308	1.01	1637.0	81.28	20.03%
DK91B	647.0	9.323	0.99	1631.0	81.34	20.08%
Ref	646.3	9.302	0.98	1645.0	81.27	20.00%
DK91B	647.0	9.320	0.99	1538.0	81.30	20.06%

Mass production data of DK91B on PERC mono compared to D/H PERC pastes

Paste	Peak-T	Uoc (mV)	Isc (A)	Rs (mOhm)	Rsh (Ohm)	FF (%)	Eff (%)	Qty(Pcs)
Ref	BSL	662.8	9.694	2.59	2362	79.52	20.90	1377
DK91B	BSL-15°C	663.1	9.721	2.54	5618	79.61	21.00	1489
Ref	BSL	659.0	9.808	2.88	786	79.18	20.95	426
DK91B	BSL-10°C	660.4	9.830	2.75	1844	79.20	21.04	490
Ref	BSL	662.1	9.644	2.03	610	79.48	20.8	14774
DK91B	BSL-8°C	662.8	9.676	2.01	636	79.49	20.9	10040

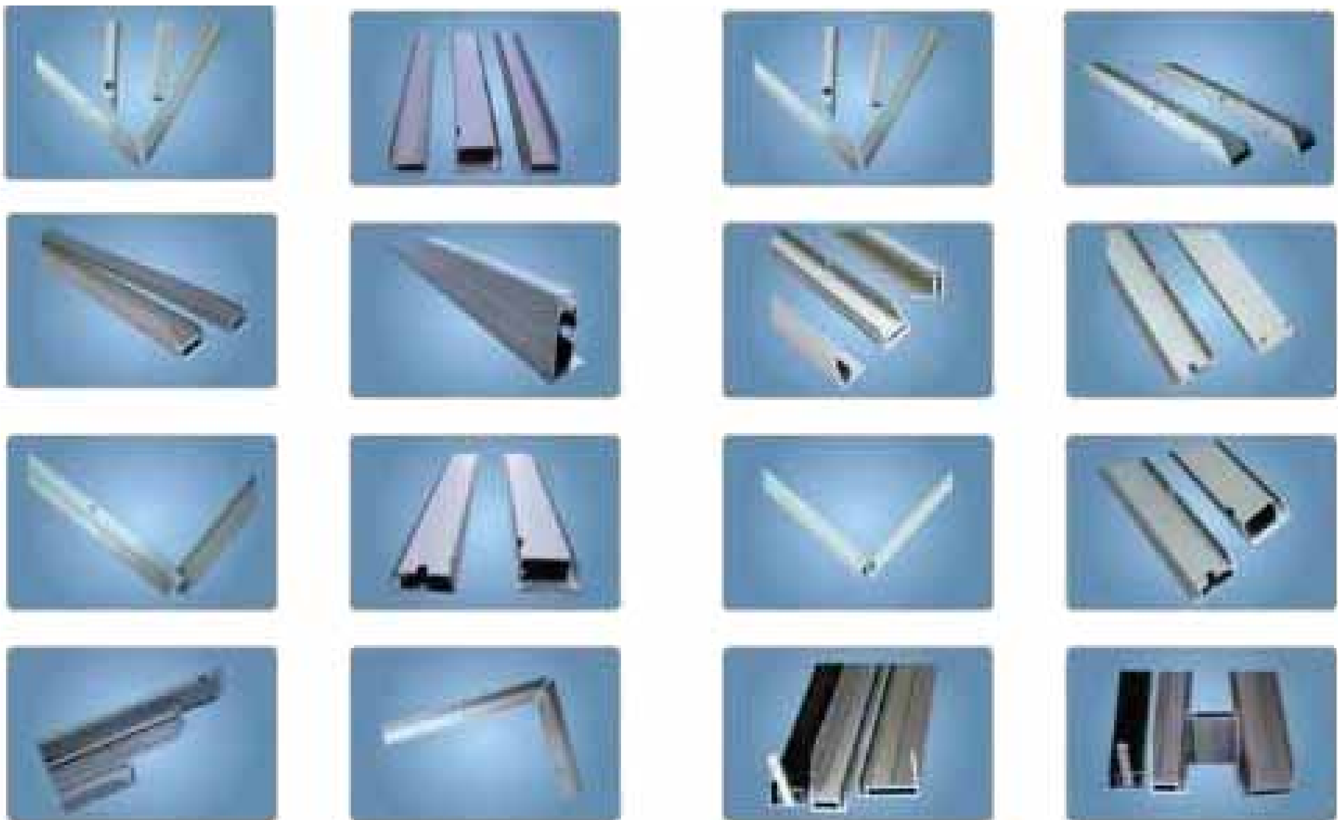


1. DK91B compatible data with standard Mono
2. ATECOM is the only 4 suppliers of silver pastes for advanced mono cells withhigh quality and process window



Aluminum Solar Panel

Product Name	Aluminum Solar Panel Frame
Material	Alloy 6063, 6061, 6005, 6060 Custom made available.
Temper	T3, T4, T5, T6,T66
Color	Natural color, Silver, Golden, Bronze, Black
Angle	45 or 90 degrees
Surface Treatment	Anodization(Clear, Satin, Bronze, Black, Golden, Silver, Other multicolor), Electrophoresis, Powder coating, PVDF coating, Wood grain painting
Mould size	25*25mm, 35*35mm,30*46mm,46*50mm, 30*25mm, 40*40mm ,50*35mm.
* Other customized Target materials are welcome	



Atecom Technology

Contact Information

Address : 4F-3, No. 58, HsingShan Road,

Neihu district, Taipei, Taiwan, R.O.C

Tel.：+886-2-27942800

Fax：+886-2-27949800

E-Mail : sales@atecom.com.tw

Website : http://www.atecom.com.tw

ATECOM
TECHNOLOGY CO., LTD.
www.atecom.com.tw