SemiLEDs LED Chip Product Portfolio

SemiLEDs Enhanced Vertical (EV™) LED series is the latest innovation in high brightness LED chips, Further design advances of the EV LED structureoffer higher thermal endurance for process temperatures up to 325° Celsius and maximum suggested junction temperature of 150° Celsius. Products are available in blue(white),green, and near - ultraviolet.

Applications

- LCD backlight
- Automotive lighting
- Miniature light engine
- Signaling
- Signage
- High Power LED
- Digital camera flash light
- General Lighting
- Architectural lighting
- Curing
- Medical

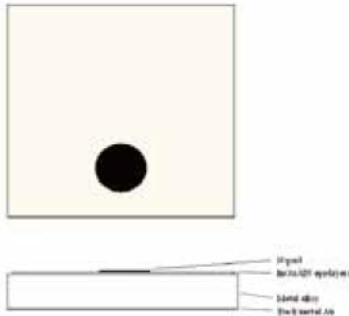
Mechanical Specifications

EV-D15A (UV) , EV-U15A (UV)

Features

Feature	Benefit
Metal alloy device	Low cost, high thermal conductivity
Thickness 80μm	Consolidated metal alloy
P-N junction high at 75 μm	Silver epoxy die attachment compatible
One pad structure	Low package cost
Nearly perfect Lambertian emission pattern	Silver epoxy die attachment compatible
Patterned Surface	Maximum light extraction
High Thermal Endurance	Eutectic die attach compatible

Chip Mechanical Diagram



Mechanical Specifications

P-N junction area	340 μm x 340 μm	± 20 μm
Base area	400 μm x 400 μm	± 25 μm
Chip thickness	80 μm	± 15 μm
Bond pad size	100 μm	± 10 μm
Bond pad thickness	7.7 μm	± 0.5 μm
Junction height	140 μm	± 15 μm

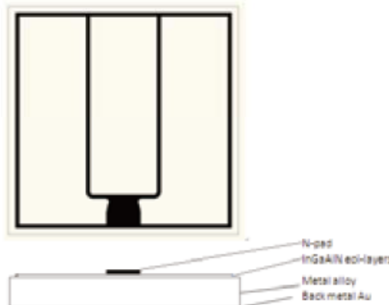
Note: The bond pad size is designed for single wire bonding. We recommend using gold ball bonding as an electrical connection. The gold ball must not extend outside of the pad area.

EV-B35A

Features

Feature	Benefit
Metal alloy device	Low cost, high thermal conductivity
Thickness 145 μm	Consolidated metal alloy
P-N junction high at 140 μm	Silver epoxy die attachment compatible
One pad structure	Low package cost
Nearly perfect Lambertian emission pattern	Silver epoxy die attachment compatible
Patterned Surface	Maximum light extraction
High Thermal Endurance	Eutectic die attach compatible

Chip Mechanical Diagram



Mechanical Specifications

P-N junction area	800 μm x 800 μm	± 20 μm
Base area	860 μm x 860 μm	± 50 μm
Chip thickness	145 μm	± 15 μm
Bond pad size	120 μm x 120 μm	± 15 μm
Bond pad thickness	7.7 μm	± 0.5 μm
Junction height	140 μm	± 15 μm

Note: The bond pad size is designed for single wire bonding. We recommend using gold ball bonding as an electrical connection. The gold ball must not extend outside of the pad area.

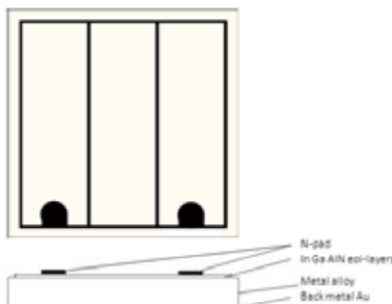
Mechanical Specifications

EV-B40A & EV-U40A (UV)

Features

Metal alloy device	Low cost, high thermal conductivity
Thickness 145 µm	Consolidated metal alloy
P-N junction high at 140 µm	Silver epoxy die attachment compatible
One pad structure	Low package cost
Nearly perfect Lambertian emission pattern	Silver epoxy die attachment compatible
Patterned Surface	Maximum light extraction
High Thermal Endurance	Eutectic die attach compatible

Chip Mechanical Diagram



Mechanical Specifications

P-N junction area	970 µm x 970 µm	± 20 µm
Base area	1070 µm x 1070 µm	± 50 µm
Chip thickness	145 µm	± 15 µm
Bond pad size	120 µm x 120 µm	± 15 µm
Bond pad thickness	7.7 µm	± 0.5 µm
Junction height	140 µm	±15 µm

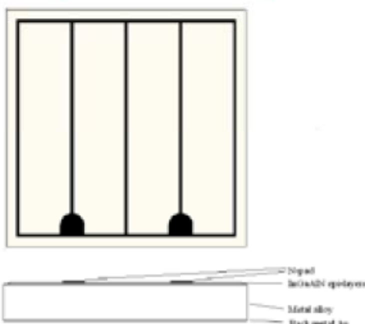
Note: The bond pad size is designed for single wire bonding. We recommend using gold ball bonding as an electrical connection. The gold ball must not extend outside of the pad area.

EV-B45A & EV-D45A (UV) & EV-G45A (Green)

Features

Metal alloy device	Low cost, high thermal conductivity
Thickness 145 µm	Consolidated metal alloy
P-N junction high at 140 µm	Silver epoxy die attachment compatible
One pad structure	Low package cost
Nearly perfect Lambertian emission pattern	Silver epoxy die attachment compatible
Patterned Surface	Maximum light extraction
High Thermal Endurance	Eutectic die attach compatible

Chip Mechanical Diagram



Mechanical Specifications

P-N junction area	1050 µm x 1050 µm	± 20 µm
Base area	1200 µm x 1200 µm	± 50 µm
Chip thickness	145 µm	± 15 µm
Bond pad size	120 µm x 120 µm	± 15 µm
Bond pad thickness	7.7 µm	± 0.5 µm
Junction height	140 µm	± 15 µm

Note: The bond pad size is designed for single wire bonding. We recommend using gold ball bonding as an electrical connection. The gold ball must not extend outside of the pad area.

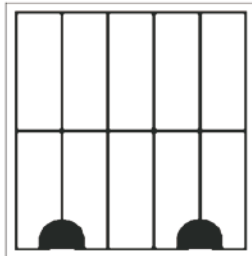
Mechanical Specifications

EV-B60A

Features

Metal alloy device	Low cost, high thermal conductivity
Thickness 145 μm	Consolidated metal alloy
P-N junction high at 140 μm	Silver epoxy die attachment compatible
One pad structure	Low package cost
Nearly perfect Lambertian emission pattern	Silver epoxy die attachment compatible
Patterned Surface	Maximum light extraction
High Thermal Endurance	Eutectic die attach compatible

Chip Mechanical Diagram



Mechanical Specifications

P-N junction area	1420 μm X 1420 μm	± 50 μm
Base area	1520μm X 1520 μm	± 50 μm
Chip thickness	145 μm	± 15 μm
Bond pad size	167 μm x 280 μm	± 15 μm
Bond pad thickness	7.7 μm	± 0.5 μm
Junction height	140 μm	± 15 μm

Note: The bond pad size is designed for single wire bonding. We recommend using gold ball bonding as an electrical connection. The gold ball must not extend outside of the pad area.

SemiLEDs EV LED (Electrical and Optical Specifications)

EV-D15A (UV)

Electrical and Optical Specifications at 20mA, Ta at 25°C

Parameter	Symbol	Min	Typ	Max	Remark
Forward voltage:	Vf		3.8	4.2	Volt
Spectra half width	Δλ		12	20	nm

Note: Measured by SemiLEDs on bare chip and is only given for information.

Absolute Maximum Ratings. Ta at 25°C

Forward Current (DC)	50 mA
LED Junction Temperature	150°C
Reverse Voltage	Note 2
Operating Temperature	-40°C to +110°C
Storage Temperature (Chip)	-40°C to +110°C
Storage Temperature (Chip on tape)	-20°C to +65 °C
Temperature during packaging (reflow)	325°C (< 5 sec)

Note: 1. Maximum ratings are strongly package dependent and may differ between different packaged devices. The values given were collected by SemiLEDs' in-house package and are only given for information.
2. UV LEDs should never be operated with reverse bias.

EV-U15A(UV)

Electrical and Optical Specifications at 20mA, Ta at 25°C

Parameter	Symbol	Min	Typ	Max	Remark
Forward voltage:	Vf		3.2	3.6	Volt
Spectra half width	Δλ		12	25	nm

Absolute Maximum Ratings. Ta at 25°C

Forward Current (DC)	50 mA
LED Junction Temperature	150°C
Reverse Voltage	Note 2
Operating Temperature	-40°C to +110°C
Storage Temperature (Chip)	-40°C to +110°C
Storage Temperature (Chip on tape)	-20°C to +65 °C
Temperature during packaging (reflow)	325°C (< 5 sec)

Note: 1. Maximum ratings are strongly package dependent and may differ between different packaged devices. The values given were collected by SemiLEDs' in-house package and are only given for information.
2. UV LEDs should never be operated with reverse bias.

SemiLEDs EV LED (Electrical and Optical Specifications)

EV-B35A

Electrical and Optical Specifications at 350mA, Ta at 25°C

Parameter	Symbol	Min	Typ	Max	Remark
Forward voltage:	Vf		3.2	3.6	Volt
Spectra half width	Δλ		20	40	nm
Reverse current	Ir			2 μA	Vr= 5 Volt

Note: Measured by SemiLEDs on bare chip and is only given for information.

Absolute Maximum Ratings. Ta at 25°C

Forward Current (DC)	500 mA
LED Junction Temperature	150°C
Reverse Voltage	5 V
Operating Temperature	-40°C to +110°C
Storage Temperature (Chip)	-40°C to +110°C
Storage Temperature (Chip on tape)	-20°C to +65 °C
Temperature during packaging (reflow)	325°C (< 5 sec)

Note: 1. Maximum ratings are strongly package dependent and may differ between different packaged devices. The values given were collected by SemiLEDs' in-house package and are only given for information.

EV-B40A

Electrical and Optical Specifications at 350mA, Ta at 25°C

Parameter	Symbol	Min	Typ	Max	Remark
Forward voltage:	Vf		3.1	3.4	Volt
Spectra half width	Δλ		20	40	nm
Reverse current	Ir			2 μA	Vr= 5 Volt

Note: Measured by SemiLEDs on bare chip and is only given for information.

Absolute Maximum Ratings. Ta at 25°C

Forward Current (DC)	700 mA
LED Junction Temperature	150°C
Reverse Voltage	5 V
Operating Temperature	-40°C to +110°C
Storage Temperature (Chip)	-40°C to +110°C
Storage Temperature (Chip on tape)	-20°C to +65 °C
Temperature during packaging (reflow)	325°C (< 5 sec)

Note: 1. Maximum ratings are strongly package dependent and may differ between different packaged devices. The values given were collected by SemiLEDs' in-house package and are only given for information.

SemiLEDs EV LED (Electrical and Optical Specifications)

EV-U40A (UV)

Electrical and Optical Specifications at 350mA, Ta at 25°C

Parameter	Symbol	Min	Typ	Max	Remark
Forward voltage:	Vf		3.3	3.6	Volt
Spectra half width	Δλ		12	25	nm

Note: Measured by SemiLEDs on bare chip and is only given for information.

Absolute Maximum Ratings. Ta at 25°C

Forward Current (DC)	700 mA
LED Junction Temperature	150°C
Reverse Voltage	Note 2
Operating Temperature	-40°C to +110°C
Storage Temperature (Chip)	-40°C to +110°C
Storage Temperature (Chip on tape)	-20°C to +65 °C
Temperature during packaging (reflow)	325°C (< 5 sec)

Note: 1. Maximum ratings are strongly package dependent and may differ between different packaged devices. The values given were collected by SemiLEDs' in-house package and are only given for information.
2. UV LEDs should never be operated with reverse bias.

EV-B45A

Electrical and Optical Specifications at 350mA, Ta at 25°C

Parameter	Symbol	Min	Typ	Max	Remark
Forward voltage:	Vf		3.1	3.4	Volt
Spectra half width	Δλ		20	40	nm
Reverse current	Ir			2 μA	Vr= 5 Volt

Note: Measured by SemiLEDs on bare chip and is only given for information.

Absolute Maximum Ratings. Ta at 25°C

Forward Current (DC)	700 mA
LED Junction Temperature	150°C
Reverse Voltage	5 V
Operating Temperature	-40°C to +110°C
Storage Temperature (Chip)	-40°C to +110°C
Storage Temperature (Chip on tape)	-20°C to +65 °C
Temperature during packaging (reflow)	325°C (< 5 sec)

Note: 1. Maximum ratings are strongly package dependent and may differ between different packaged devices. The values given were collected by SemiLEDs' in-house package and are only given for information.

SemiLEDs EV LED (Electrical and Optical Specifications)

EV-G45A

Electrical and Optical Specifications at 350mA, Ta at 25°C

Parameter	Symbol	Min	Typ	Max	Remark
Forward voltage:	Vf		3.2	3.6	Volt
Spectra half width	Δλ		35	50	nm
Reverse current	Ir			2 μA	Vr= 5 Volt

Note: Measured by SemiLEDs on bare chip and is only given for information.

Absolute Maximum Ratings. Ta at 25°C

Forward Current (DC)	700 mA
LED Junction Temperature	150°C
Reverse Voltage	5 V
Operating Temperature	-40°C to +110°C
Storage Temperature (Chip)	-40°C to +110°C
Storage Temperature (Chip on tape)	-20°C to +65 °C
Temperature during packaging (reflow)	325°C (< 5 sec)

Note: 1. Maximum ratings are strongly package dependent and may differ between different packaged devices. The values given were collected by SemiLEDs' in-house package and are only given for information.

EV-D45A (UV)

Electrical and Optical Specifications at 350mA, Ta at 25°C

Parameter	Symbol	Min	Typ	Max	Remark
Forward voltage:	Vf		3.7	4.2	Volt
Spectra half width	Δλ		12	20	nm

Note: Measured by SemiLEDs on bare chip and is only given for information.

Absolute Maximum Ratings. Ta at 25°C

Forward Current (DC)	700 mA
LED Junction Temperature	150°C
Reverse Voltage	Note 2
Operating Temperature	-40°C to +110°C
Storage Temperature (Chip)	-40°C to +110°C
Storage Temperature (Chip on tape)	-20°C to +65 °C
Temperature during packaging (reflow)	325°C (< 5 sec)

Note: 1. Maximum ratings are strongly package dependent and may differ between different packaged devices. The values given were collected by SemiLEDs' in-house package and are only given for information.
2. UV LEDs should never be operated with reverse bias.

SemiLEDs EV LED (Electrical and Optical Specifications)

EV-B60A

Electrical and Optical Specifications at 700mA, Ta at 25°C

Parameter	Symbol	Min	Typ	Max	Remark
Forward voltage:	Vf		3.2	3.6	Volt
Spectra half width	Δλ		20	40	nm
Reverse current	Ir			2 μA	Vr= 5 Volt

Note: Measured by SemiLEDs on bare chip and is only given for information.

Absolute Maximum Ratings. Ta at 25°C

Forward Current (DC)	1500 mA
LED Junction Temperature	150°C
Reverse Voltage	5 V
Operating Temperature	-40°C to +110°C
Storage Temperature (Chip)	-40°C to +110°C
Storage Temperature (Chip on tape)	-20°C to +65 °C
Temperature during packaging (reflow)	325°C (< 5 sec)

Note: 1. Maximum ratings are strongly package dependent and may differ between different packaged devices. The values given were collected by SemiLEDs' in-house package and are only given for information.

PRODUCT BIN TABLES

SemiLEDs EV Chips Product Bin Tables

EV-D15A (UV)

Bin Table (Output power at 20mA, Ta at 25°C)

IS(mW)/wp(nm)	360-365	365-370	370-375
3-4	UA03		
4-5	UA04		
5-6	UA05	UB05	
6-7	UA06	UB06	
7-8	UA07	UB07	
8-9	UA08	UB08	UC08
9-10	UA09	UB09	UC09
10-11	UA10	UB10	UC10

IS(mW)/wp(nm)	360-365	365-370	370-375
11-12	UA11	UB 11	UC11
12-13		UB12	UC12
13-14		UB13	UC13
14-15		UB14	UC14
15-16		UB15	UC15
16-18			UC16
18-20			UC18
20-22			UC20

EV-U15A (UV)

Bin Table (Output power at 20mA, Ta at 25°C)

IS(mW)/wp(nm)	375-380	380-385	385-390	390-395	395-400	400-405	405-410	410-415	415-420	420-425
11-12	UD11	UE11	UF11	UG11	UH11	UJ11	UK11			
12-13	UD12	UE13	UF12	UG12	UH12	UJ12	UK12			
13-14	UD13	UE13	UF13	UG13	UH13	UJ13	UK13			
14-15	UD14	UE14	UF14	UG14	UH14	UJ14	UK14			
15-16	UD15	UE15	UF15	UG15	UH15	UJ15	UK15	UL15	UM15	UN15
16-18	UD16	UE16	UF16	UG16	UH16	UJ16	UK16	UL16	UM16	UN16
18-20	UD18	UE18	UF18	UG18	UH18	UJ18	UK18	UL18	UM18	UN18
20-22	UD20	UE20	UF20	UG20	UH20	UJ20	UK20	UL20	UM20	UN20
22-24				UG22	UH22	UJ22	UK22	UL22	UM22	UN22
24-26				UG24	UH24	UJ24	UK24	UL24	UM24	UN24
26-28								UL26	UM26	UN26
28-30								UL28	UM28	UN28

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SemiLEDs EV Chips Product Bin Tables

EV-B35A

Bin Table (Output power at 350mA, Ta at 25°C)

IS(mW)/wd(nm)	447.5-450	450-452.5	452.5-455	455-457.5	457.5-460	460-462.5	462.5-465
220-240	BDB2	BEB0	BFB0	BGB0	BHB0	BJB0	BKB0
240-260	BDB4	BEB4	BFB4	BGB4	BHB4	BJB4	BKB4
260-280	BDB6	BEB6	BFB6	BGB6	BHB6	BJB6	BKB6
280-300	BDB8	BEB8	BFB8	BGB8	BHB8	BJB8	BKB8
300-320	BDC0	BEC0	BFC0	BGC0	BHC0	BJC0	BKC0
320-340	BDC2	BEC2	BFC2	BGC2	BHC2	BJC2	
340-360	BDC4	BEC4	BFC4	BGC4	BHC4	BJC4	
360-380	BDC6	BEC6	BFC6	BGC6	BHC6	BJC6	

EV-B40A

Bin Table (Output power at 350mA, Ta at 25°C)

IS(mW)/wd(nm)	447.5-450	450-452.5	452.5-455	455-457.5	457.5-460	460-462.5	462.5
300-320	BDC0	BEC0	BFC0	BGC0	BHC0	BJC0	BK
320-340	BDC2	BEC2	BFC2	BGC2	BHC2	BJC2	BK
340-360	BDC4	BEC4	BFC4	BGC4	BHC4	BJC4	BK
360-380	BDC6	BEC6	BFC6	BGC6	BHC6	BJC6	BK
380-400	BDC8	BEC8	BFC8	BGC8	BHC8	BJC8	BK
400-420	BDD0	BED0	BFD0	BGD0	BHD0	BJD0	BKD
IS(mW)/wd(nm)	465-467.5	467.5-470	470-472.5	472.5-475	475-477.5	477.5-480	
300-320	BLC0	BMC0	BNC0	BPC0	BQC0	BRC0	
320-340	BLC2	BMC2	BNC2	BPC2	BQC2	BRC2	
340-360	BLC4	BMC4	BNC4	BPC4	BQC4	BRC4	
360-380	BLC6	BMC6	BNC6	BPC6	BQC6	BRC6	

PRODUCT BIN TABLES

SemiLEDs EV Chips Product Bin Tables

EV-U40A (UV)

Bin Table (Output power at 350mA, Ta at 25°C)

IS(mW)/wd(nm)	375-380	380-385	385-390	390-395	395-400	400-405	405-410	410-415	415-420	420-425
75-80	UD75	UE75	UF75							
80-90	UD80	UE80	UF80							
90-100	UD90	UE90	UF90							
100-110	UDA0	UEA0	UFA0							
110-120	UDA1	UEA1	UFA1	UGA1	UHA1					
120-130	UDA2	UEA2	UFA2	UGA2	UHA2					
130-140	UDA3	UEA3	UFA3	UGA3	UHA3					
140-160	UDA4	UEA4	UFA4	UGA4	UHA4					
160-180	UDA6	UEA6	UFA6	UGA6	UHA6	UJA6	UKA6	ULA6	UMA6	
180-200	UDA8	UEA8	UFA8	UGA8	UHA8	UJA8	UKA8	ULA8	UMA8	
200-220	UDB0	UEB0	UFB0	UGB0	UHB0	UJB0	UKB0	ULB0	UMB0	UNB0
220-240	UDB2	UEB2	UFB2	UGB2	UHB2	UJB2	UKB2	ULB2	UMB2	UNB2
240-260		UEB4	UFB4	UGB4	UHB4	UJB4	UKB4	ULB4	UMB4	UNB4
260-280		UEB6	UFB6	UGB6	UHB6	UJB6	UKB6	ULB6	UMB6	UNB6
280-300				UGB8	UHB8	UJB8	UKB8	ULB8	UMB8	UNB8
300-320				UGC0	UHC0	UJC0	UKC0	ULC0	UMC0	UNC0
320-340				UGC2	UHC2	UJC2	UKC2	ULC2	UMC2	UNC2
340-360										UNC4
360-380										UNC6

SemiLEDs EV Chips Product Bin Tables

EV-D45A (UV)

Bin Table (Output power at 350mA, Ta at 25°C)

IS(mW)/wp(nm)	360-365	365-370	370-375
80-90	UA80	UB90	
90-100	UA90	UB90	UC90
100-110	UBA0	UBA0	UCA0
110-120	UAA0	UBA1	UCA1
120-130		UBA2	UCA2
130-140		UBA3	UCA3

IS(mW)/wp(nm)	360-365	365-370	370-375
140-160		UBA4	UCA4
160-180		UBA6	UCA6
180-200		UBA8	UCA8
200-220		UBB0	UCB0
220-240		UBB2	UCB2

EV-G45A

Bin Table (Output power at 350mA, Ta at 25°C)

Wd Range(nm)	16-18cd	18-20cd	20-22cd	22-24cd	24-28cd
515-520	FD	FE	FF	FJ	FK
520-525	GD	GE	GF	GJ	GK
525-530	HD	HE	HF	HJ	HK
530-535	ID	IE	IF	I J	IK

EV-B60A

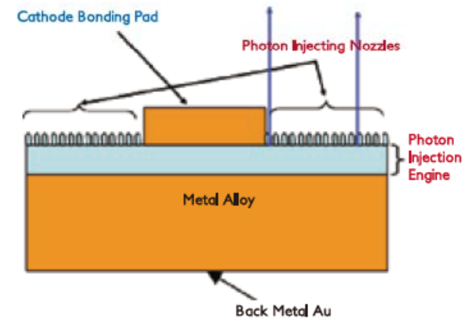
Bin Table (Output power at 700mA, Ta at 25°C)

IS(mW)/wd(nm)	447.5-450	450-452.5	452.5-455	455-457.5	457.5-460	460-462.5	462 .5-465
600-650	BDF0	BEF0	BFF0	BGF0	BHF0	BJF0	B KF0
650-700	BDF5	BEF5	BFF5	BGF5	BHF5	BJF5	B KF5
700-750	BDG0	BEG0	BFG0	BGG0	BHG0	BJG0	B KG0
750-800	BDG5	BEG5	BFG5	BGG5	BHG5	BJG5	
800-900	BDH0	BEH0	BFH0	BGH0	BHH0	BJH0	

SemiLEDs General Guidelines

How to get the best performance form MvpLED

The MvpLED™ chip can be divided into three parts: metal alloy, photon injection engine, and photon injecting nozzles. The metal alloy is soft, and the photon injection engine and photon injecting nozzles are fragile. According to the different mechanical properties of these parts, the user should be very careful to prevent large local stress on the chip during the packaging process. If there is any large local stress, it may damage the photon injecting nozzles or the photon injection engine.



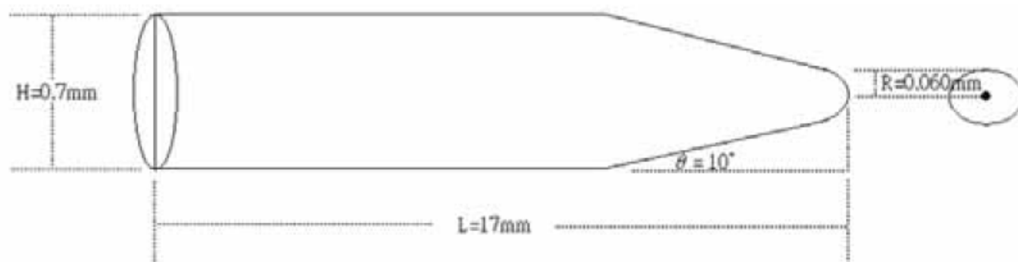
Die Attach Process

Die Attach (also known as Die Bond or Die Mount) is the process of attaching the LED chip to the contact pad of the lead frame in the package. There are three main steps of the die attach process. In the first step, chip adhesive via solder paste or solder is dispensed on to the contact pad. Then, the die is ejected from the wafer tape by a push-up needle, which pushes upward on the backside of the die and dislodges the die off the wafer tape. In the third step, a pick-and-place tool picks the die from the wafer tape and positions it on the dispensed solder.

The key factors for Automatic Operation

1. The amount of the adhesive (Ag epoxy or solder): Although the junction height is 75~140μm, too much adhesive will cause the p-n junction to short.
2. Dimension of the push-up needle: The dimension of the push-up needle should fit the chip. The following example shows the different dimensions of the push-up needles used for different types of chips and sizes.

Example: where in the R=0.060



3. Pick-and-place
   (1) Tool: We recommend using an antistatic plastic tool which is made of rubber. Do not use pick-up tools made of hard materials like tungsten carbide or steel, these kinds of tips may cause mechanical damage to the chip. The following example shows the different dimensions of rubber tips to be used for different types of chips.
   (2) Delay time: Lower suction force is better for MvpLED chips. The following example shows the different delay times used for different types of chips.

For more detailed handling and package notes, please visit our website: www.semileds.com

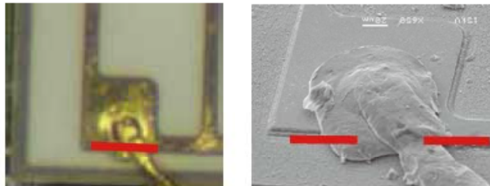
SemiLEDs General Guidelines

Wire Bond Process

Gold ball bonding as the electrical connection is recommended. During the bonding process, bonding time, power and force are to be monitored to avoid excessive mechanical stress on the Light Emitting Diode (LED). Mechanical stress and contact of gold ball to the semiconductor layer may cause catastrophic failure. Suggestions for each parameter are as follows:

Parameters	First bond(N-Pad)
Bond time(ms)	10
Power(Dac)	70
Force(gf)	30

Bonding NG



Note::Please consult with SemiLEDs sales department if wire bonder parameters not adjustable.

Encapsulation Materials

Silicone resin is recommended for blue, green and white packaged components. For Ultraviolet LEDs, hermetic seal with glass cover and nitrogen gas infill is recommended.

Please note that although most silicone encapsulants available in the market are compatible with MvpLED chips, in-house tests showed that certain additive material to silicone will damage MvpLED's passivation, increase risk of decay and/or failure. Below models are recommended models:

Manufacturer	Model
Momentive Corp.	1063
Dow Corning Corp.	OE-6636
Dow Corning Corp.	OE-6450

For more detailed handling and package notes, please visit our website: www.semileds.com

SemiLEDs General Guidelines

Soldering

Manual soldering should be avoided at any stages of process. For reflow or solder paste process, low melting point solder such as Sn/Bi is recommended.

Electrostatic Discharge (ESD) Protection

ESD has a high tendency of damaging LEDs. The following precautions are recommended to minimize ESD occurrence and/or damage.

- All equipment should be properly grounded.
- Use grounding wrist bands or anti-electrostatic gloves when handling LEDs.
- Use an ionic fan when peeling blue tape off releasing paper.
- Incorporate a zener diode into all emitters or build a protective component at the module level.

Note:

Prolonged high temperature exposure is NOT recommended. When curing silver epoxy or silicone, our suggested parameters are:

- Less than 10 hours at 150C
- Less than 3 hours at 180C

Please consult with SemiLEDs' Sales team if you are unsure about compatibility of your curing parameters.

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