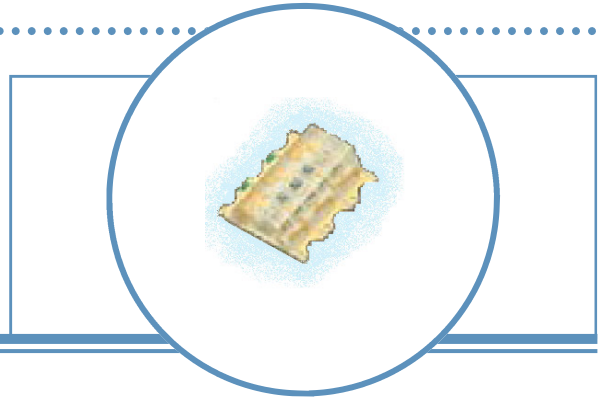


# Full Color SMT Chip LED (3.5 x 3.0 x 1.4 mm)

## OVSTRGBFC6

- Red/green/blue + white in single surface mount package
- 8 mm tape on 7" reel compatible with automatic placement equipment
- Each chip individually addressable to provide color on-demand
- ESD protected [ $\pm 1$  kV, 1 time (200 pF 0  $\Omega$ )]

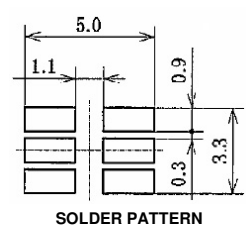
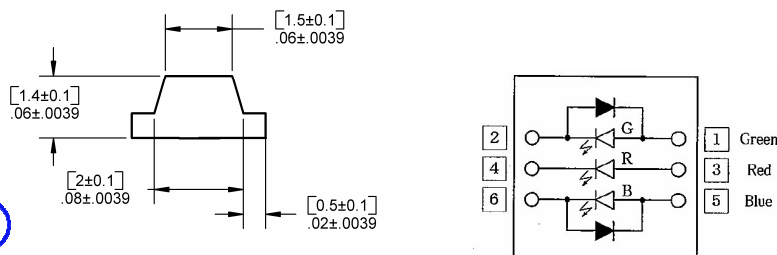
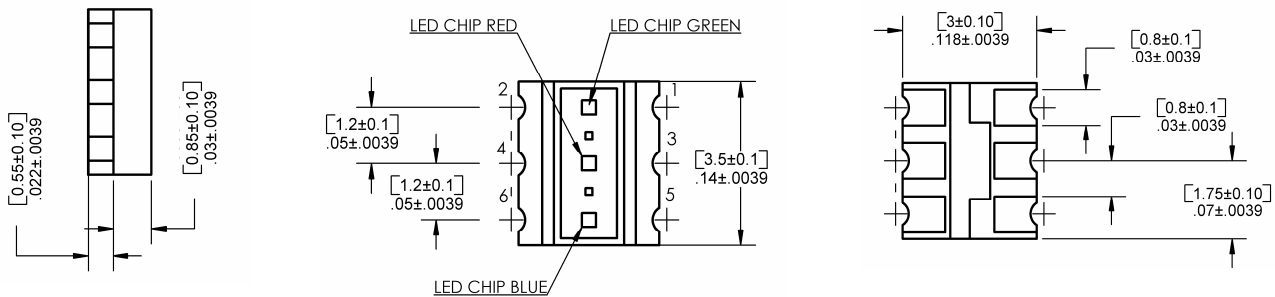


The **OVSTRGBFC6** is a full-color chip LED with multiple viewing angles and the ability to produce all colors of the visible spectrum, plus white. This small package, combined with high-light output, is ideal for miniature applications.

## Applications

- Automotive (backlighting in dashboard and switches)
- Telecommunications (indicator and backlighting in telephone and fax)
- Flat backlight (LCDs, membrane switches and symbols)
- Personal/portable appliances (mobile phones, pagers, audio/video players and GPS)

Part Number	Material	Emitted Color	Intensity Typ. mcd	Lens Color
OVSTRGBFC6	AllnGaP/InGaN	Red/Green/Blue	53/165/46	Water Clear



**DO NOT LOOK DIRECTLY AT LED WITH UNSHIELDED EYES OR DAMAGE TO RETINA MAY OCCUR.**

OPTEK reserves the right to make changes at any time in order to improve design and to supply the best product possible.

# Full-Color SMT Chip LED

## OVSTRGBFC6



### Absolute Maximum Ratings

$T_A = 25^\circ\text{C}$  unless otherwise noted

SYMBOL	PARAMETER	VALUE			UNIT
		RED	GREEN	BLUE	
$P_D$	Power Dissipation (1 chip on)	68	98	98	mW
$I_F$	DC Forward Current (1 chip on)	25	25	25	mA
$P_D$	Power Dissipation (2 or 3 chips on)	22	33	33	mW
$I_F$	DC Forward Current (2 or 3 chips on)	10	10	10	mA
$I_{FP}$	Pulsed Forward Current <sup>1</sup>	100	100	100	mA
$\Delta I_F$	DC forward Current Reduction <sup>2</sup> ( $T_A \geq 40^\circ\text{C}$ ) (1 chip on)	-0.425			mA/ $^\circ\text{C}$
	DC forward Current Reduction <sup>2</sup> ( $T_A \geq 40^\circ\text{C}$ ) (3 chips on)	-0.1			
$T_{OPR}$	Operating Temperature	-30 ~ +80			$^\circ\text{C}$
$T_{STG}$	Storage Temperature	-40 ~ +100			$^\circ\text{C}$

Notes:

- Duty  $\leq 5\%$ , Pulse Width  $\leq 1$  msec.
- $T_{OPR} = 40 \sim 80^\circ\text{C}$ . Use under this condition.

### Electrical Characteristics

$T_A = 25^\circ\text{C}$  unless otherwise noted

RED						
SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	CONDITIONS
$V_F$	Forward Voltage	----	1.9	2.4	V	$I_F = 20$ mA
$I_R$	Reverse Current	----	----	100	$\mu\text{A}$	$V_R = 5$ V
$I_V$	Luminous Intensity (Axial Direction)	22	----	127	mcd	$I_F = 20$ mA
$\lambda_d$	Dominant Wavelength	621	----	631	nm	$I_F = 20$ mA
$\lambda_\Delta$	Spectral Line Half Width	----	15	----	nm	$I_F = 20$ mA

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# Full-Color SMT Chip LED

## OVSTRGBFC6



### Electrical Characteristics

T<sub>A</sub> = 25°C unless otherwise noted

GREEN						
SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	CONDITIONS
V <sub>F1</sub>	Forward Voltage	----	3.3	3.9	V	I <sub>F</sub> = 20 mA
V <sub>F2</sub>		2.0	----	----	V	I <sub>F</sub> = 5 μA
I <sub>v</sub>	Luminous Intensity (Axial Direction)	82	----	372	mcd	I <sub>F</sub> = 20 mA
λ <sub>d</sub>	Dominant Wavelength	520	----	540	nm	I <sub>F</sub> = 20 mA
Δλ	Spectral Line Half Width	----	35	----	nm	I <sub>F</sub> = 20 mA

### Electrical Characteristics

T<sub>A</sub> = 25°C unless otherwise noted

BLUE						
SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	CONDITIONS
V <sub>F1</sub>	Forward Voltage	----	3.4	3.9	V	I <sub>F</sub> = 20 mA
V <sub>F2</sub>		2.0	----	----	V	I <sub>F</sub> = 5 μA
I <sub>v</sub>	Luminous Intensity (Axial Direction)	25	----	101	mcd	I <sub>F</sub> = 20 mA
λ <sub>d</sub>	Dominant Wavelength	460	----	480	nm	I <sub>F</sub> = 20 mA
Δλ	Spectral Line Half Width	----	25	----	nm	I <sub>F</sub> = 20 mA

### Ranking

I<sub>F</sub> = 20 mA

LUMINOUS INTENSITY (mcd)			
RANK	RED	GREEN	BLUE
J	22 ~ 53	82 ~ 165	25 ~ 46
K			46 ~ 101
L		165 ~ 372	25 ~ 46
M	46 ~ 101		
N	53 ~ 127	82 ~ 165	25 ~ 46
P			46 ~ 101
Q		165 ~ 372	25 ~ 46
R			46 ~ 101

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# Full-Color SMT Chip LED

## OVSTRGBFC6



### Reliability Tests

TEST ITEM	STANDARD TEST METHOD <sup>1</sup>	TEST CONDITIONS		FAILURE RATE <sup>2, 3</sup>
Operating Test	ED-4701-D-511	1 chip on <sup>4</sup>	$T_A = 25^\circ\text{C}$ , $I_F = 25\text{ mA}$ , DC <sub>2</sub> t = 1000 hours	0/20
		3 chips on <sup>4</sup>	$T_A = 25^\circ\text{C}$ , $I_F = 10\text{ mA}$ , DC <sub>2</sub> t = 1000 hours	0/20
High Temp Storage Test	ED-4701-3-B-111A	$T_A = 100^\circ\text{C}$ , t = 1000 hours		0/20
Low Temp Storage Test	ED-4701-3-B-112A	$T_A = 30^\circ\text{C}$ , t = 1000 hours		0/20
High Humidity Storage Test	ED-4701-3-B-121A	$T_A = 85^\circ\text{C}$ , RH $\geq$ 85%, t = 1000 hours		0/20
High Temp Operating Test	----	1 chip on <sup>4</sup>	$T_A = 80^\circ\text{C}$ , $I_F = 8\text{ mA}$ , DC <sub>2</sub> t = 1000 hours	0/20
High Temp and High Humidity Operating Test	ED-4701-3-B-122A	1 chip on <sup>4</sup>	$T_A = 60^\circ\text{C}$ , RH $\geq$ 90%, t = 1000 hours, $I_F = 16\text{ mA}$ , DC	0/20
Temperature Cycle Test	ED-4701-3-B-131A	$T_A = (-30^\circ\text{C}, 30\text{ minutes} \sim 100^\circ\text{C}, 30\text{ minutes})$ x 100 cycles		0/20
Thermal Shock Test	ED-4701-3-B-141A	$T_A = (-40^\circ\text{C}, 5\text{ minutes} \sim 80^\circ\text{C}, 5\text{ minutes})$ x 50 cycles		0/20
Fall Test	----	h = 1 m, maple tree board, 10 times		0/20

### Failure Criteria

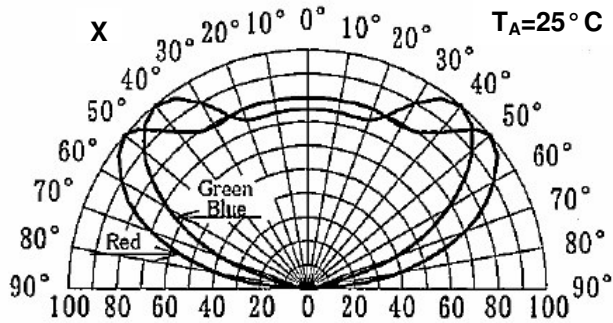
SYMBOL	ITEM	MIN	MAX	CONDITIONS
$V_F$	Forward Voltage	----	U.S.L. x 1.1 <sup>5</sup>	$I_F = 20\text{ mA}$
$V_R$		2.0	----	$I_F = 5\text{ }\mu\text{A}$
$I_R$	Reverse Current (red only)	----	100 $\mu\text{A}$	$V_R = 5\text{ V}$
$I_V$	Luminous Intensity	L.S.L. x 0.5 <sup>6</sup>	----	$I_F = 20\text{ mA}$

Notes:

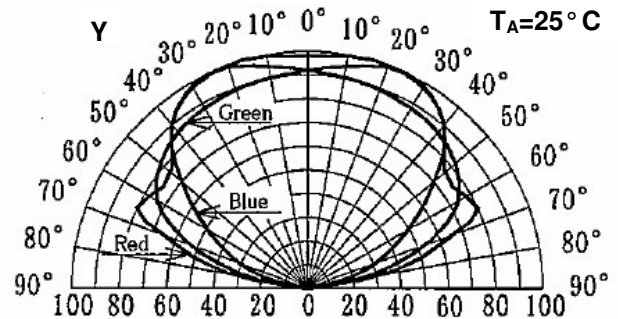
- Number: EIAJ ("Electronic Industries Association of Japan") standard methods are used.
- Failure rate is obtained when there is no damage by static electricity.
- Failure rate evaluated based on "Criteria for Judging the Damage" table.
- One (1) chip on = electric current only to one color in one LED. Three (3) chips on = electric current to the red, the green and the blue simultaneously.
- U.S.L.: Upper Standard Level (see maximum values on red, green and blue Electrical tables on pages 2 and 3).
- L.S.L.: Lower Standard Level (see minimum values on red, green and blue Electrical tables on pages 2 and 3).

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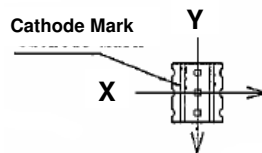
Radiation Patterns



Relative Luminous Intensity

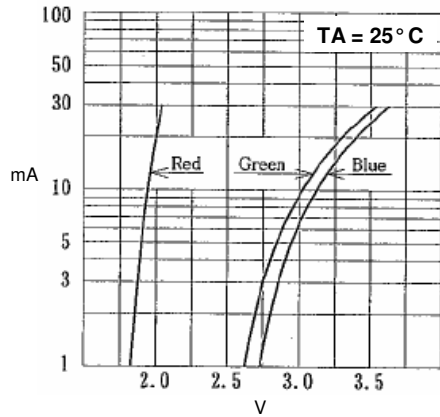


Relative Luminous Intensity

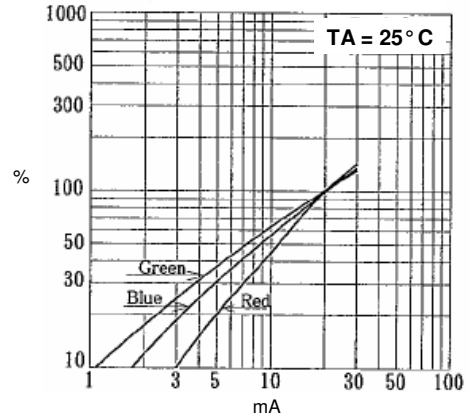


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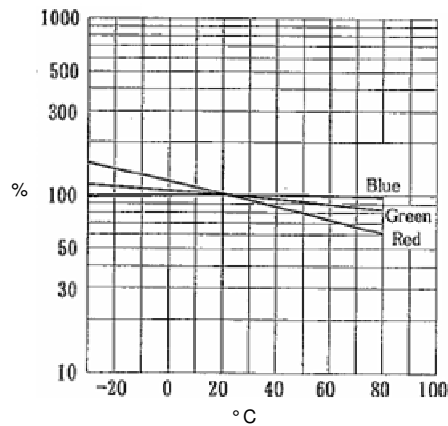
### Typical Electro-Optical Characteristics Curves



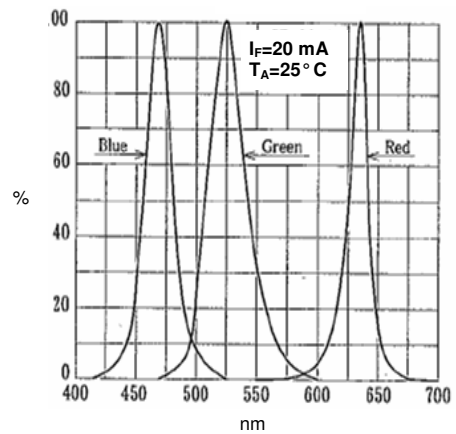
Forward Voltage vs Forward Current



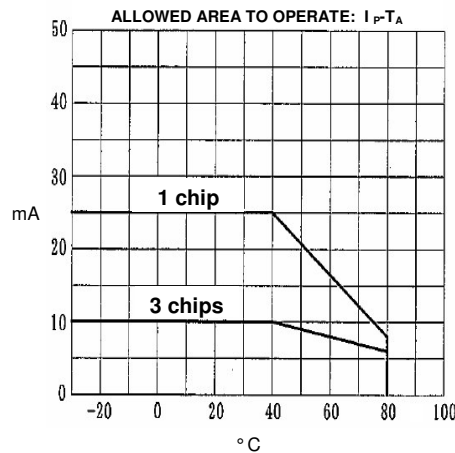
Forward Current vs Relative Luminous Intensity



Ambient Temperature vs Relative Luminous Intensity



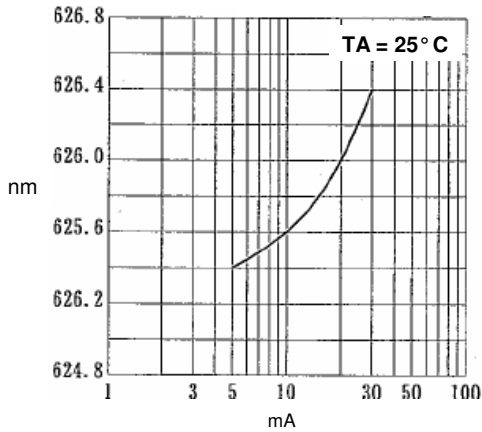
Wavelength vs Relative Intensity



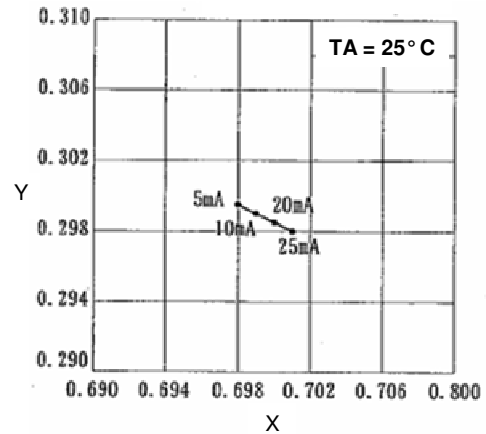
Forward Current vs Ambient Temperature

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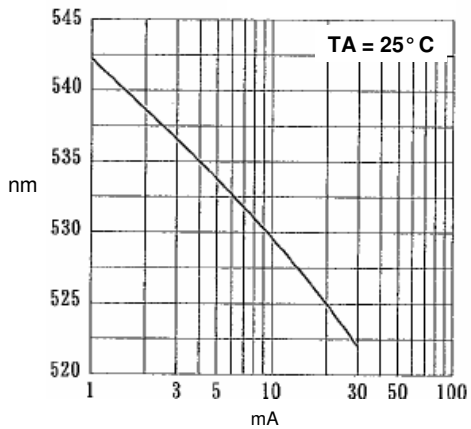
### Typical Electro-Optical Characteristics Curves



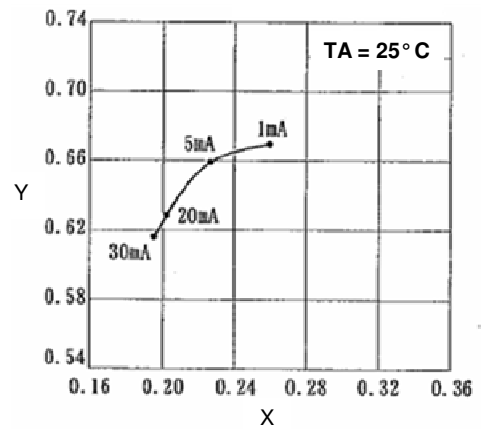
Red: Forward Current vs Dominant Wavelength



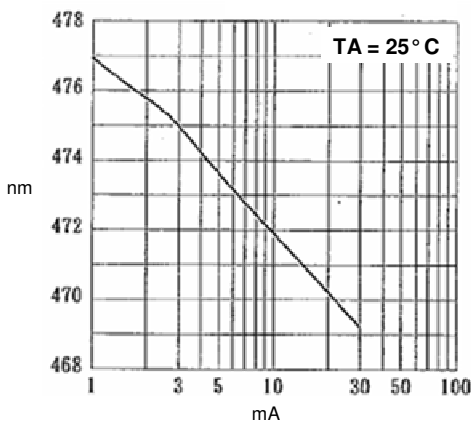
Red: Forward Current vs Chromaticity Diagram



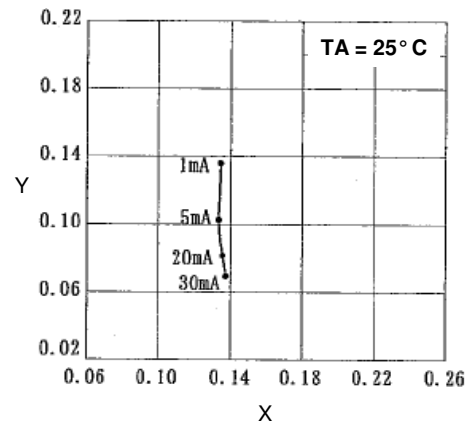
Green: Forward Current vs Dominant Wavelength



Green: Forward Current vs Chromaticity Diagram



Blue: Forward Current vs Dominant Wavelength



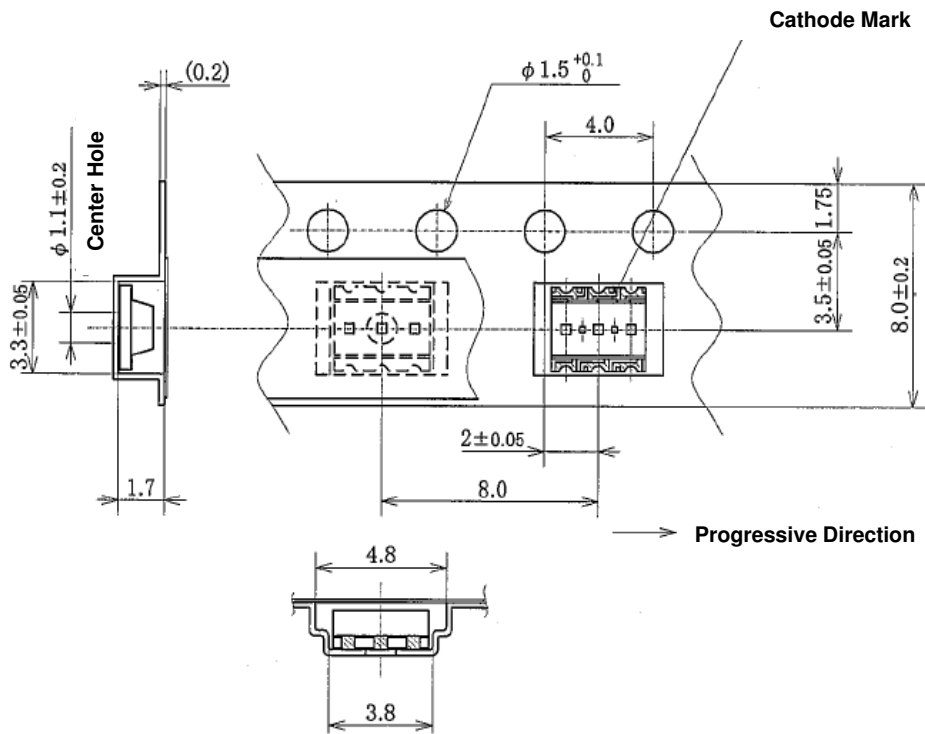
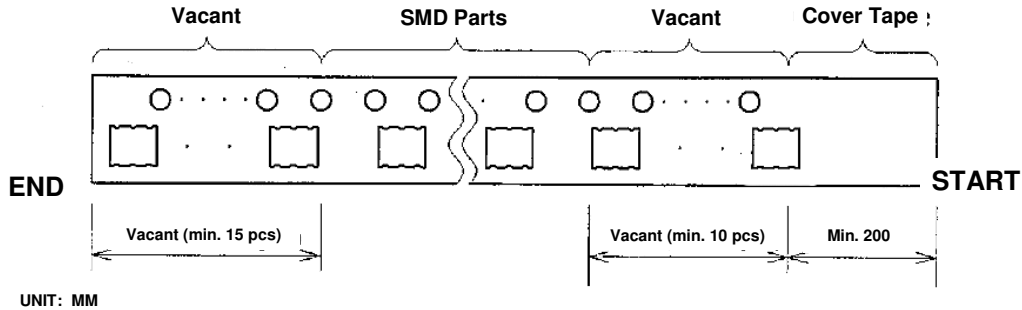
Blue: Forward Current vs Chromaticity Diagram

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# Full-Color SMT Chip LED

## OVSTRGBFC6

Carrier Tape Dimensions: Loaded quantity 1000 pieces per reel



**Notes:**

1. General tolerance is  $\pm 0.1$ .
2. Cover tape peeling-off strength is 0.29 - 0.58 N (10° tear-away angle of the cover tape and the carrier tape).

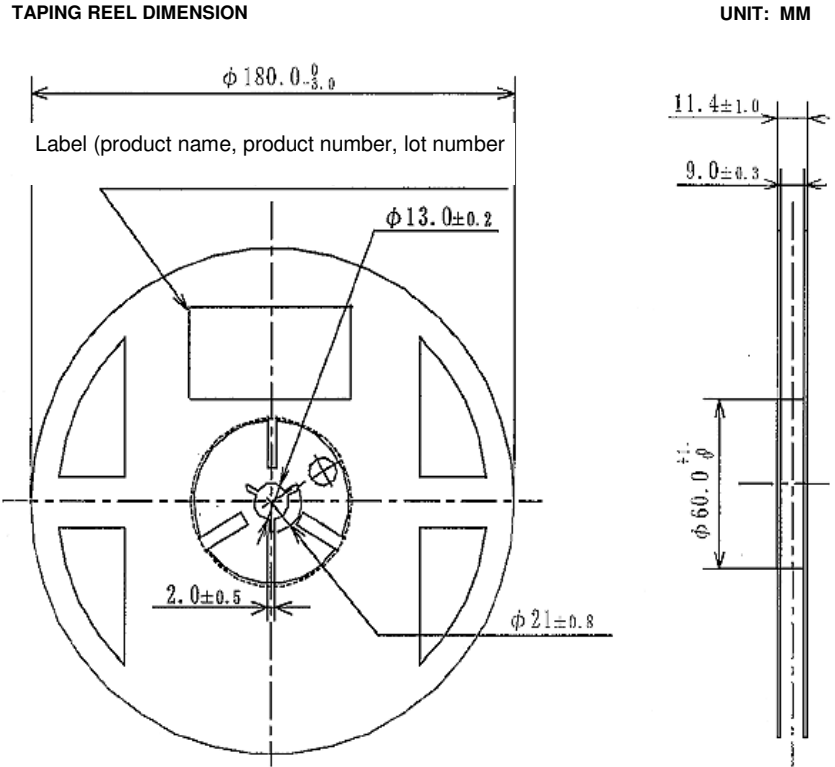
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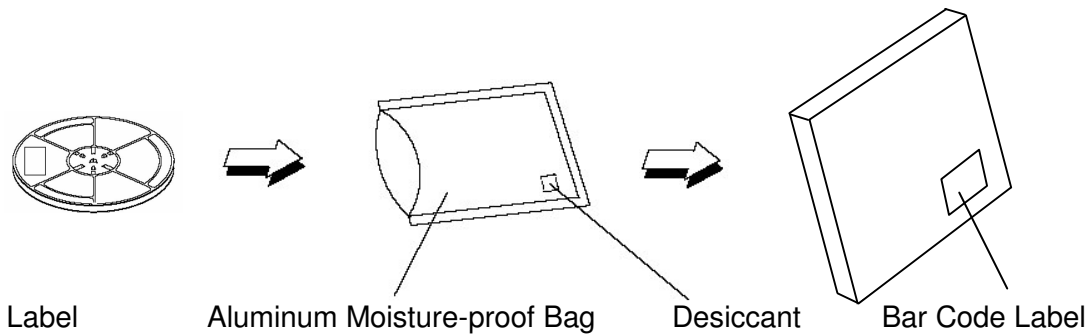
# Full-Color SMT Chip LED

## OVSTRGBFC6

Packing Information: 1000 pieces on 7-inch reel sealed in ESD protected bag



### Moisture Resistant Packaging



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