

# HID Headlight AFL

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# HID Headlight AFL

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**VISHAY components used for HID Headlight/AFL applications include:**

- HEXFET Power MOSFETS
  - TVS
  - Rectifier Diodes
  - Schottky Diodes
  - Fast Switching Diodes
  - LEDs
  - Film Capacitors
  - Multilayer Ceramic Capacitors
  - Aluminum Electrolytic Capacitors
  - Thick Film Chip Resistors
  - Power Shunt Resistors
  - NTC Thermistors
  - Power Storage Inductors
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## **Application Overview**

The market for xenon and bi-xenon high-intensity discharge (HID) lighting is growing. Bi-xenon means that only one xenon light source is used to create both low and high beams via a mechanical shutter. Vishay supports xenon and bi-xenon HID applications with a variety of discrete electronic components. The ballasts and motor controls for headlight leveling (HLL) and advanced front lighting (AFL) controllers need discrete components. Improved visibility and safety on the road are the reasons for the success of gas discharge lamps (xenon). Because its very fast reaction time improves safety, LED technology is used for tail lights. In the future, LEDs will be used more and more for headlights because of their design flexibility, energy-savings, and very long lifetimes.

# HID Headlight AFL : AFL / HLL Motor Drive, H-Bridge

## Alu Elcaps

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">140CRH</a>		Aluminum capacitors, SMD (chip); high temperature capable;	10μF...4700μF Life@125°C 6000h	SMD max.18x18x21	AEC Q200
<a href="#">140RTM</a>		Aluminum capacitors, radial; high temperature, miniature;	22 μF - 4700 μF; Life@125°C = 4000h	TH / Radial max.18x31mm	AEC Q200
<a href="#">146CTI</a>		Aluminum Capacitors; SMD (Chip); low impedance, high temperature	22...4700μF, Life@125°C = 6000h	SMD max 18x18x21	AEC Q200
<a href="#">146RTI</a>		Aluminum Capacitors; Radial; low impedance, high temperature	68...6800μF, Life@125°C = 6000h	TH / Radial max18x35mm	AEC Q200
<a href="#">150CRZ</a>		Aluminum capacitors, SMD (chip); very low Z, Pb-free;	4,7...10000μF, Life@105°C 10000h	SMD max 18x18x21	AEC Q200
<a href="#">150RMI</a>		Aluminum capacitors, radial miniature; low impedance;	100μF - 6800μF; life at 105°C = 10000 h;	TH / Radial max.18mm x 31mm	AEC Q200
<a href="#">153CRV</a>		Aluminum capacitors, SMD (chip); long life, vertical, Pb-free;	0.47μF - 1000μF; Life@105°C 3000h	SMD max.10x10x14	

## Current Sense Resistors

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">WSL2726</a>	NEW	Power Metal Strip Shunts; 4-Term Design For Accurate Sensing Very Low R Value; Very Low TCR;	R0003...R005; 1% TCR <= 75ppm; P70 = 3W	SMD 2726	AEC Q200
<a href="#">WSL2816</a>		Power Metal Strip Shunts; Very Low R-Value; Very Low TCR; Low Thermal EMF;	R01...R1 , 1%,; TCR <= ± 75ppm P70 = 2W	SMD 2816	AEC Q200

## Inductors

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">IHLP5050FD-A1</a>		Low-profile, high-current, shielded; low DCR, high saturation;	0.1μH - 10μH; IDC = 120A - 15.5A	SMD 5050	

## MOSFETs

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">SQ7414EN</a>	NEW	Low gate charge, low thermal resistance; high-current, LS-/HS-switch, N-/P-Ch; AEC Q-101 qualified	N-Channel; 60V; rDS(on) = 0.025Ohms;	SMD PowerPAK1212-8	AEC Q101
<a href="#">SQ7415EN</a>	NEW	Low gate charge, low thermal resistance; high-current, LS-/HS-switch, N-/P-Ch; AEC Q-101 qualified	P-Channel; 60V; rDS(on) = 0.065Ohms;	SMD PowerPAK1212-8	AEC Q101

## Shunt Resistors

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">WSH2818</a>	NEW	Power Metal Strip Shunts; Very High Power- Small Size; Low Thermal EMF;	R001...R1, 1% TCR<= ± 75ppm P70 = 5W	SMD 2818	AEC Q200
<a href="#">WSL3921</a>	NEW	Power Metal Strip shunts; very low R-value, very low TCR; low thermal EMF	R0003...R004, 1% TCR <= ± 75ppm P70 = 3W	SMD 3921	AEC Q200
<a href="#">WSLT2512</a>	NEW	Power Metal Strip shunt; High Temp. (275°C); Low TCR; low thermal EMF	R01 - R50; 1%; TCR <= ± 75ppm P70 = 1W	SMD 2512	AEC Q200

## Thick Film Resistors

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">CRCW0603</a>		Bulk resistors, pulse resistant;	1R - 10MΩ; 1%;	SMD	AEC Q200

Product Name	Status	Description	Features	Package	Q-Level
		good long-term stability;	TCR = 100	0603	
<a href="#">CRWC0805</a>		Bulk resistors, pulse resistant; good long-term stability;	1R - 10M $\Omega$ ; 1%; TCR = 100	SMD 0603	

## HID Headlight AFL : Ballast, Discharge Resistors

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### Wire Wound Resistor

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">WSZ6720</a>		Up to 4 W, cemented, high surge current; low cost;	1.8 W; 1R - 510R; Tol. = 1 % - 10 %;	SMD 6720	
<a href="#">WSZ7532</a>		Low-cost wire-wound, silicone coating High surge current	P = 3.75 W; 1R - 15K $\Omega$ ; Tol. = 1%, 3%, 5%, 10 %;	SMD 7532	

## HID Headlight AFL : Ballast, EMI Filtering

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### Inductors

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">IHLP2525EZ-01</a>		Low-profile, high-current; high transient spike capable; shielded, low-DCR	0.56 - 10 $\mu$ H; IDC=12A-4.5A	SMD 2525	
<a href="#">IHLP4040DZ-A1</a>		Low-profile, high-current; high transient spike capable; shielded, low-DCR	0.19 - 10 $\mu$ H; IDC=90A-12A	SMD 4040	
<a href="#">IHLP5050FD-A1</a>		Low-profile, high-current; high transient spike capable; shielded, low-DCR	0.1 $\mu$ H - 10 $\mu$ H; IDC = 120A - 15.5A	SMD 5050	

## HID Headlight AFL : Ballast, Filter Capacitors

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### Alu Elcaps

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">146CTI</a>		Aluminum Capacitors; SMD (Chip); low impedance, high temperature	22...4700 $\mu$ F, Life@125°C = 6000h	SMD max 18x18x21	AEC Q200
<a href="#">150CRZ</a>		Aluminum capacitors, SMD (chip); very low Z, Pb-free;	4,7 ... 10000 $\mu$ F, Life@105°C 10000h	SMD max 18x18x21	AEC Q200
<a href="#">153CRV</a>		Aluminum capacitors, SMD (chip); long life, vertical, Pb-free;	0.47 $\mu$ F - 1000 $\mu$ F; Life@105°C 3000h	SMD 10x10x14mm	

## HID Headlight AFL : Ballast, Reverse Polarity Protection

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### MOSFETs

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">SUD50N03-06AP</a>		P-Channel, T <sub>j</sub> = 175 °C power MOSFET; high-side reverse polarity protection;	P-Channel; rDS(on) = 0.155Ohms;	SMD TO-252	
<a href="#">SUD50N03-11</a>		Low Side Reverse Polarity protection;	P-Channel; 60V; rDS(on) = 0.340Ohms;	SMD TO-252	
<a href="#">SUD50N04-10P</a>		Fully AEC Q-101 qualified; low thermal resistance, fast switching;	P-Channel; rDS(on) = 0.065Ohms;	SMD TO-252	
<a href="#">SUM110P04-05</a>		P-Channel, T <sub>j</sub> = 175 °C power MOSFET; high-side reverse polarity protection;	P-Channel; rDS(on) = 0.004Ohms;	SMD TO-263	



## HID Headlight AFL : Ballast, Switch Mode Power Supply ; Flyback

### Alu Elcaps

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">146CTI</a>		Aluminum Capacitors; SMD (Chip); low impedance, high temperature	22...4700 $\mu$ F, Life@125°C = 6000h	SMD max 18x18x21	AEC Q200
<a href="#">150CRZ</a>		Aluminum capacitors, SMD (chip); very low Z, Pb-free;	4,7...10000 $\mu$ F, Life@105°C 10000h	SMD max 18x18x2	AEC Q200
<a href="#">153CRV</a>		Aluminum capacitors, SMD (chip); long life, vertical, Pb-free;	0.47 $\mu$ F - 1000 $\mu$ F; Life@105°C 3000h	SMD 10x10x14mm	

### Ceramic Capacitors

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">VJ...31/VJ...34</a> <a href="#">Automotive MLCC</a>		SMD Ceramic Capacitor Solutions High Voltage Applications Boardflex-Sensitive Applications	1.0pF...1 $\mu$ F 10Vdc ... 3000Vdc	SMD 0402...1812	

### current Sense Shunt Resistors

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">WSLT2512</a>		Power Metal Strip Shunts; High Temp. (275°C); Low TCR; low thermal EMF	R01...R5, 1%, TCR <= $\pm$ 75ppm P70 = 1W	SMD 2512	AEC Q200

### MOSFETs

Product Name	Status	Description	Features	Package	Q-Level
SUM110N10-25L		N-Channel MOSFET, logic-level; low side switch, flyback;	N-Channel; 100V; rDS(on) = 0.025Ohms;	SMD TO-263	
<a href="#">SUM85N15-19</a>		N-Channel MOSFET , logic-level; low side switch, boost;	N-Channel; 100V rDS(on) = 0.250Ohms;	SMD TO-263	
SUM90N10-19L		N-Channel MOSFET, logic-level; low side switch, flyback;	N-Channel; 100V rDS(on) = 0.019Ohms;	SMD TO-263	

### Schottky diodes

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">SS3P4L</a>		Low VF, high current density;	VF = 0.335 V	SMD TO-277A(SMPC)	AECQ
<a href="#">SS3P6L</a>	NEW	Low VF, high current density;	VF = 0.478 V	SMD TO-277A(SMPC)	AECQ

## HID Headlight AFL : Bi-Xenon Shutter, Transient Protection

### Ceramic Capacitors

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">VJ...31/VJ...34 Automotive MLCC</a>		SMD Ceramic Capacitor Solutions High Voltage Applications Boardflex-Sensitive Applications	1.0pF...1μF 10Vdc ... 3000Vdc	SMD 0402...1812	

### Shunt Resistors

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">WSL3921</a>		Power Metal Strip Shunts; Very Low R-Value; Very Low TCR; low thermal EMF;	R0003...R004, 1% TCR <= ± 75ppm P70 = 3W	SMD 3921	AEC Q200
<a href="#">WSR-3</a>		Current Sense Power Metal Strip; High Power; Molded;	R001...R2, 1% TCR <= ± 75ppm P70 = 3W	SMD 4527	AEC Q200

### TVS

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">P4KE39A</a>		400 W, unidirectional and bi-directional Tjmax = 175 °C;	IFSM = 40A	DO-204AL	AEC Q101
<a href="#">TPSMPxxA-HE3</a>		400 W, unidirectional TVS, Tj = 185 °C;	Vbreak = 6.8 V - 43 V; IFSM = 40 A;	TH / Axial DO-204AL	AEC Q101

# HID Headlight AFL : Ignition, Avalanche Rectifier

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## Ultrafast Avalanche Rectifier

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">BYG20D - J</a>		Glass passivated junction; low reverse current 1 $\mu$ A; 20 mJ;	200 V - 600 V, IF = 1.5A; IFSM = 30A	SMD DO214AC (SMA)	AEC Q101

## HID Headlight AFL : Ignition, Boost Capacitor

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### Alu Elcaps

Product Name	Status	Description	Features	Package	Q-Level
152 CLT		SMD, high-voltage, low-ESR; high ripple current; long lifetime, 150°C	1µF - 2.2µF; 400 VDC	SMD 10x10x14mm	

### Film Capacitor

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">MKT1820</a>		High transient, robust, >20 V/µsec; long lifetime, low profile;	400VDC; 0.68 µF;	SMD 1820	

## HID Headlight AFL : Ignition, Booster Rectification

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### High-Power Ultrafast

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">BYG20D - J</a>		Glass passivated junction; low reverse current 1 $\mu$ A, 20 mJ;	200 V - 600 V, IF = 1.5A; IFSM = 30A	SMD DO214AC (SMA)	AEC Q101

## HID Headlight AFL : Ignition, Buffering

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### Tantalum Capacitor

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">TH3</a>		150 °C rated, low ESR; 100% surge current tested;	6.3V-50VDC; 0,33-220µF;	SMD B / C / D / E	AEC Q200

## HID Headlight AFL : Ignition, Charge Resistors

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### Thick Film Resistor

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">D25/CRCW1206IF</a>		Very high pulse power;	1R - 10M $\Omega$ ; 1%; TCR = 100	SMD 1206	AEC Q200

## HID Headlight AFL : Ignition, Discharge Resistors

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### Thick Film Resistor

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">D25/CRCW1206IF</a>		Very high pulse power;	1R - 10M $\Omega$ ; 1%; TCR = 100	SMD 1206	AEC Q200



## HID Headlight AFL : Ignition, Overvoltage Protection

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TVS

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">SM8SxxA</a>		High surge capability, low profile; AEC-Q101 qualified	6.6 kW; IFSM = 700A; Tj = 175 °C	SMD DO-218 AB	AEC Q101

## HID Headlight AFL : Ignition, Timing

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### Tantalum Capacitor

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">TP3</a>		High Performance automotive Grade	4V-50VDC ; 0,1 $\mu$ F-470 $\mu$ F	SMD A/B/C/D/E Case	AEC Q200

## HID Headlight AFL : IR Camera Flashing, Camera Flashing IR

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### High Radiant Intensity IR Emitter

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">VSMY7850X01</a>	NEW	Surface emitting diodes, high-power; high-speed, low thermal resistance;	170mW/sr; 850nm	Little Star SMD	AECQ
<a href="#">VSMY7852X01</a>	NEW	Surface emitting diodes, High-Power high-speed, low thermal resistance	850nm 42mw/sr	Little Star SMD	AECQ

## HID Headlight AFL : IR Camera Flashing, ESD Protection

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### ESD Diodes

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">SE10PB..PJ</a>	NEW	ESD protection rectifier; low reverse current, 175 °C; AEC-Q101 qualified	100V - 600V; If = 1A; SMP	SMD DO-220AA (SMP)	AEC Q101

## HID Headlight AFL : IR Camera Flashing, Fast Switching

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### MOSFETs

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">Si7922DN</a>		Dual MOSFET, 100 V; very fast switching performance;	N-Channel; 100V; Dual; 2.5A; rDS(on) = 0.195Ohms	SMD PowerPAK 1212-8	
<a href="#">SQ7414EN</a>	NEW	Low gate charge, low thermal resistance; high-current, LS-/HS-siwth, N-/P-Ch; AEC-Q101 qualified	N-Channel; 60V; rDS(on) = 0.025Ohms;	SMD PowerPAK1212-8	AEC Q101

## HID Headlight AFL : IR Camera Flashing, Transient Protection

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TVS

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">SM8SxxA</a>		High surge capability, low profile; AEC Q101	6.6 kW; IFSM = 700A; Tj = 175 °C	SMD DO-218 AB	AEC Q101

## HID Headlight AFL : LED Daylighting, Signal Lighting LED Driver

### LED CLCC

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">SMZGnnB</a>		Power voltage-regulating diode; glass passivated chip, low impedance;	Vz = 9.1V - 68V; IR =5 $\mu$ A; PD = 1.5W	SMD DO-215AA (SMBG)	AEC Q101

### LED TELUX

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">VLWR9630</a>		LED	Red, 611 to 634nm high luminousflux	TELUX	AECQ
<a href="#">VLWR9932</a>		LED	Red, 611 to 634 nm high luminousflux	TELUX	AECQ
<a href="#">VLWTG9600</a>		LED	Green, 509 to 535 nm high luminousflux	TELUX	AECQ
<a href="#">VLWTG9900</a>		LED	Green, 509 to 535 nm high luminousflux	TELUX	AECQ
<a href="#">VLWY9630</a>		LED	Yellow, 585 to 597 nm high luminous flux	TELUX	AECQ
<a href="#">VLWY9932</a>		LED	Yellow, 585 to 597 nm, high luminous flux	TELUX	AECQ

### MOSFETs

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">Si2318CDS</a>		N-Channel 40V (D-S) MOSFET	rDS(on) = 0.042Ohms ID= 5.6A	SMD TO-236(SOT-23)	
<a href="#">SQ2309ES</a>	NEW	P-Channel; MOSFET for general applications; Automotive AEC-Q101 Qualified	N-Channel; 60V;Id=-1.7A rDS(on) = .335 $\Omega$ @-10V Tj=-55 $^{\circ}$ C-+175 $^{\circ}$ C	SMD TO-236(SOT-23)	
<a href="#">SQ7415EN</a>	NEW	Fully AEC Q-101 qualified; low thermal resistance, fast switching;	P-Channel; rDS(on) = 0.065Ohms;	SMD PowerPAK1212-8	AEC Q101

### Shunt Resistors

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">WSL0603</a>		Power Metal Strip Shunts; Very Low R Value; Very Low TCR; low thermal EMF;	R01 - R1; 1 %; TCR <= $\pm$ 75ppm P70 = 0.1W	SMD 0603	AEC Q200
<a href="#">WSL0805</a>		Power Metal Strip Shunts; Very Low R Value; Very Low TCR; low thermal EMF;	R005 - R2; 1 %; TCR <= $\pm$ 75ppm P70 = 0.125W	SMD 0805	AEC Q200

# HID Headlight AFL : LED Daylighting, White LED Power Switch ; SMPS Buck / Boost ; Current Regulated

## MOSFETs

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">SQ7415EN</a>	NEW	Fully AEC Q-101 qualified; low thermal resistance, fast switching;	P-Channel; rDS(on) = 0.065Ohms;	SMD PowerPAK1212-8	AEC Q101
<a href="#">SUD50P10-43L</a>		P-Channel, high-voltage, low rDS(on); logic-level, boost switch;	P-Channel; 100V; rDS(on) = 0.043Ohms;	SMD TO-252	

## Storage Inductor

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">IHLP1616AB-01</a>		Low-profile, high-current; high saturation current, shielded;	0.047 - 1uH; IDC=13A - 4A	SMD 1616	
IHLP2020		Low-profile, high-current; high saturation current, shielded;	0.1 - 2.2μH; IDC=30A - 5A	SMD 2020	
<a href="#">IHLP2525EZ-01</a>		Low-profile, high-current; high saturation current, shielded;	0.1 - 10μH; IDC=60A - 7A	SMD 2525	
<a href="#">IHLP4040DZ-01</a>		Low-profile, high-current; high saturation current, shielded;	0.56 - 10μH; IDC=12A-4.5A	SMD 4040	
IHLP5050EZ-11		Low-profile, high-current; high saturation current, shielded;	0.19 - 10μH; IDC=90A-12A	SMD 5050	
<a href="#">IHLP5050FD-01</a>		Low-profile, high-current; high saturation current, shielded;	0.1μH - 10μH; IDC = 120A - 15.5A	SMD 5050	
IHLP6767		Low-profile, high-current; high saturation current, shielded;	0.1μH - 10μH; IDC = 120A - 15.5A	TH / Radial 6767	

## Thick Film Resistors

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">CRCW0402</a>		Low-profile, high-power;	1R - 10MΩ; 1%; TCR = 100	SMD 0402	AEC Q200
<a href="#">CRCW0603</a>		Low-profile, high-power;	1R - 10MΩ; 1%; TCR = 100	SMD 0603	AEC Q200
<a href="#">CRCW0805</a>		Low-profile, high-power;	1R - 10MΩ; 1%; TCR = 100	SMD 0805	AEC Q200
<a href="#">CRCW1206</a>		Low-profile, high-power;	1R - 10MΩ; 1%; TCR = 100	SMD 1206	AEC Q200
<a href="#">CRCW1210</a>		Low-profile, high-power;	1R - 10MΩ; 1%; TCR = 100	SMD 1210	AEC Q200
<a href="#">CRCW2010</a>		Low-profile, high-power;	1R - 10MΩ; 1%; TCR = 100	SMD 2010	AEC Q200
<a href="#">CRCW2512</a>		Low-profile, high-power;	1R - 10MΩ; 1%; TCR = 100	SMD 2512	AEC Q200



## HID Headlight AFL : LED Signal Lighting, LED

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### Signal Lighting

Product Name	Status	Description	Features	Package	Q-Level
<a href="#">TLWO/Y7900</a>		AllnGaP up to 110°C; low thermal resistance; 2 kV ESD protected	> 2000mlm / 70mA	TH / Radial TELUX	