

# HID Headlight AFL

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<b>Table of Contents</b>	
<b>AFL / HLL Motor Drive, H-Bridge.....</b>	<b>3</b>
<b>Ballast, Discharge Resistors.....</b>	<b>5</b>
<b>Ballast, EMI Filtering.....</b>	<b>6</b>
<b>Ballast, Filter Capacitors.....</b>	<b>7</b>
<b>Ballast, Reverse Polarity Protection.....</b>	<b>8</b>
<b>Ballast, Switch Mode Power Supply ; Flyback.....</b>	<b>9</b>
<b>Bi-Xenon Shutter, Transient Protection.....</b>	<b>10</b>
<b>Ignition, Avalanche Rectifier.....</b>	<b>11</b>
<b>Ignition, Boost Capacitor.....</b>	<b>12</b>
<b>Ignition, Booster Rectification.....</b>	<b>13</b>
<b>Ignition, Buffering.....</b>	<b>14</b>
<b>Ignition, Charge Resistors.....</b>	<b>15</b>
<b>Ignition, Discharge Resistors.....</b>	<b>16</b>
<b>Ignition, Overvoltage Protection.....</b>	<b>17</b>
<b>Ignition, Timing.....</b>	<b>18</b>
<b>IR Camera Flashing, Camera Flashing IR.....</b>	<b>19</b>
<b>IR Camera Flashing, ESD Protection.....</b>	<b>20</b>
<b>IR Camera Flashing, Fast Switching.....</b>	<b>21</b>
<b>IR Camera Flashing, Transient Protection.....</b>	<b>22</b>
<b>LED Daylighting, Signal Lighting LED Driver.....</b>	<b>23</b>
<b>LED Daylighting, White LED Power Switch ; SMPS Buck / Boost ; Current Regulated.....</b>	<b>24</b>
<b>LED Signal Lighting, LED.....</b>	<b>25</b>

# 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
140CRH		Aluminum capacitors, SMD (chip); high temperature capable;	10µF...4700µF Life@125°C 6000h	SMD max.18x18x21	AEC Q200
140RTM		Aluminum capacitors, radial; high temperature, miniature;	22 µF - 4700 µF; Life@125°C = 4000h	TH / Radial max.18x31mm	AEC Q200
146CTI		Aluminum Capacitors; SMD (Chip); low impedance, high temperature	22...4700µF, Life@125°C = 6000h	SMD max 18x18x21	AEC Q200
146RTI		Aluminum Capacitors; Radial; low impedance, high temperature	68...6800µF, Life@125°C = 6000h	TH / Radial max18x35mm	AEC Q200
150CRZ		Aluminum capacitors, SMD (chip); very low Z, Pb-free;	4,7...10000µF, Life@105°C 10000h	SMD max 18x18x21	AEC Q200
150RMI		Aluminum capacitors, radial miniature; low impedance;	100µF - 6800µF; life at 105°C = 10000 h;	TH / Radial max.18mm x 31mm	AEC Q200
153CRV		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
WSL2726	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
WSL2816		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
IHLP5050FD-A1		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
SQ7414EN	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
SQ7415EN	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
WSH2818	NEW	Power Metal Strip Shunts; Very High Power- Small Size; Low Thermal EMF;	R001...R1, 1% TCR<= ± 75ppm P70 = 5W	SMD 2818	AEC Q200
WSL3921	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
WSLT2512	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
CRCW0603		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	
CRWC0805		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
WSZ6720		Up to 4 W, cemented, high surge current; low cost;	1.8 W; 1R - 510R; Tol. = 1 % - 10 %;	SMD 6720	
WSZ7532		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
IHLP2525EZ-01		Low-profile, high-current; high transient spike capable; shielded, low-DCR	0.56 - 10 $\mu$ H; IDC=12A-4.5A	SMD 2525	
IHLP4040DZ-A1		Low-profile, high-current; high transient spike capable; shielded, low-DCR	0.19 - 10 $\mu$ H; IDC=90A-12A	SMD 4040	
IHLP5050FD-A1		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
146CTI		Aluminum Capacitors; SMD (Chip); low impedance, high temperature	22...4700 $\mu$ F, Life@125°C = 6000h	SMD max 18x18x21	AEC Q200
150CRZ		Aluminum capacitors, SMD (chip); very low Z, Pb-free;	4,7...10000 $\mu$ F, Life@105°C 10000h	SMD max 18x18x21	AEC Q200
153CRV		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
SUD50N03-06AP		P-Channel, Tj = 175 °C power MOSFET; high-side reverse polarity protection;	P-Channel; rDS(on) = 0.155Ohms;	SMD TO-252	
SUD50N03-11		Low Side Reverse Polarity protection;	P-Channel; 60V; rDS(on) = 0.340Ohms;	SMD TO-252	
SUD50N04-10P		Fully AEC Q-101 qualified; low thermal resistance, fast switching;	P-Channel; rDS(on) = 0.065Ohms;	SMD TO-252	
SUM110P04-05		P-Channel, Tj = 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
146CTI		Aluminum Capacitors; SMD (Chip); low impedance, high temperature	22...4700 $\mu$ F, Life@125°C = 6000h	SMD max 18x18x21	AEC Q200
150CRZ		Aluminum capacitors, SMD (chip); very low Z, Pb-free;	4,7...10000 $\mu$ F, Life@105°C 10000h	SMD max 18x18x2	AEC Q200
153CRV		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
VJ...31/VJ...34 Automotive MLCC		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
WSLT2512		Power Metal Strip Shunts; High Temp. (275°C); Low TCR; low thermal EMF	R01...R5, 1%, TCR $\leq \pm 75$ ppm 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	
SUM85N15-19		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
SS3P4L		Low VF, high current density;	VF = 0.335 V	SMD TO-277A(SMPC)	AECQ
SS3P6L	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
VJ....31/VJ....34 Automotive MLCC		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
WSL3921		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
WSR-3		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
P4KA39A		400 W, unidirectional TVS, Tj = 185 °C;	Vbreak = 6.8V - 43V; IFSM = 40A	TH / Axial DO-41	AEC Q101
TPSMPxxA-HE3		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
BYG20D - J		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
MKT1820		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
BYG20D - J		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
TH3		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
D25/CRCW1206IF		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
D25/CRCW1206IF		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
SM8SxxA		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
TP3		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
VSMY7850X01	NEW	Surface emitting diodes, high-power; high-speed, low thermal resistance;	170mW/sr; 850nm	Little Star SMD	AECQ
VSMY7852X01	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
SE10PB..PJ	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
Si7922DN		Dual MOSFET, 100 V; very fast switching performance;	N-Channel; 100V; Dual; 2.5A; rDS(on) = 0.195Ohms	SMD PowerPAK 1212-8	
SQ7414EN	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
SM8SxxA		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
SMZGnnB		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
VLWR9630		LED	Red, 611 to 634nm high luminousflux	TELUX	AECQ
VLWR9932		LED	Red, 611 to 634 nm high luminousflux	TELUX	AECQ
VLWTG9600		LED	Green, 509 to 535 nm high luminousflux	TELUX	AECQ
VLWTG9900		LED	Green, 509 to 535 nm high luminousflux	TELUX	AECQ
VLWY9630		LED	Yellow, 585 to 597 nm high luminous flux	TELUX	AECQ
VLWY9932		LED	Yellow, 585 to 597 nm, high luminous flux	TELUX	AECQ

### MOSFETs

Product Name	Status	Description	Features	Package	Q-Level
Si2318CDS		N-Channel 40V (D-S) MOSFET	rDS(on) = 0.042Ohms ID= 5.6A	SMD TO-236(SOT-23)	
SQ2309ES	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)	
SQ7415EN	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
WSL0603		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
WSL0805		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
SQ7415EN	NEW	Fully AEC Q-101 qualified; low thermal resistance, fast switching;	P-Channel; rDS(on) = 0.065Ohms;	SMD PowerPAK1212-8	AEC Q101
SUD50P10-43L		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
IHLP1616AB-01		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	
IHLP2525EZ-01		Low-profile, high-current; high saturation current, shielded;	0.1 - 10μH; IDC=60A - 7A	SMD 2525	
IHLP4040DZ-01		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	
IHLP5050FD-01		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
CRCW0402		Low-profile, high-power;	1R - 10MΩ; 1%; TCR = 100	SMD 0402	AEC Q200
CRCW0603		Low-profile, high-power;	1R - 10MΩ; 1%; TCR = 100	SMD 0603	AEC Q200
CRCW0805		Low-profile, high-power;	1R - 10MΩ; 1%; TCR = 100	SMD 0805	AEC Q200
CRCW1206		Low-profile, high-power;	1R - 10MΩ; 1%; TCR = 100	SMD 1206	AEC Q200
CRCW1210		Low-profile, high-power;	1R - 10MΩ; 1%; TCR = 100	SMD 1210	AEC Q200
CRCW2010		Low-profile, high-power;	1R - 10MΩ; 1%; TCR = 100	SMD 2010	AEC Q200
CRCW2512		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
TLWO/Y7900		AllnGaP up to 110°C; low thermal resistance; 2 kV ESD protected	> 2000mlm / 70mA	TH / Radial TELUX	

