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TSHF5210, TSHF6210, TSHF5410, TSHF6410 - Change in Chip

For further information, please contact your regional Vishay office.

CONTACT INFORMATION

Americas

Vishay Intertechnologies, Inc., Business Marketing The Americas - Opto
2585 Junction Avenue
-
San Jose California United States 95134-1923
Phone: +1-408-567-8358
Fax: +1-408-240-5687
-

Europe

VISHAY Semiconductor GmbH, Business Marketing Europe - Opto
Theresienstr. 2
-
Heilbronn Germany 74025
Phone: +49-7131-7498-645
Fax: +49-7131-67-3144
-

Asia

VISHAY Intertechnology Asia Pte. Ltd., Business Marketing Asia/Japan
25 Tampines Street 92
Keppel Building # 02-00
Singapore Singapore 528877
Phone: +65 6780 7879
Fax: +65 6780 7897
-

Description of Change: Introduction of new state-of-the art chip technology (MOCVD) to ensure long term availability of product series. Opto-electronical performance tailored to fit closest to prior performance.

Classification of Change: Introduction of new chip generation to ensure long term availability

Expected Influence on Quality/Reliability/Performance: No influence on quality and reliability expected. Neverthess, we recommend to test the product in customer application.

Part Numbers/Series/Families Affected: Please see materials list on the succeeding page.

Vishay Brand(S): Vishay Semiconductors

Time Schedule:

Start Shipment Date: Fri Sep 1, 2023

Sample Availability: Thursday June 1, 2023

Product Identification: Date Code

Qualification Data: Available upon request

This PCN is considered approved, without further notification, unless we receive specific customer concerns before Mon Jul 31, 2023 or as specified by contract.

Issued By: Sebastian Riester, sebastian.riester@vishay.com

TSHF5210	TSHF5210-ES21	TSHF5410	TSHF5410-ES21	TSHF6210
TSHF6210-CS21	TSHF6210-ES21	TSHF6410	TSHF6410-ASZ	TSHF6410-ES21
TSHF6410-KSZ				

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TSHFxxxx PCN - surface emitting chip technology

What will change?

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TSHF5210 / TSHF6210 PCN

Key message:

- Slightly smaller angle of half intensity
- Same radiant power
- Higher radiant intensity
- Higher forward voltage
- No change in package dimensions

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Page 1 of datasheet - Introduction

Pre PCN

TSHF5210

www.vishay.com

Vishay Semiconductors

High Speed Infrared Emitting Diode, 890 nm, GaAlAs Double Hetero

94 8390

FEATURES

- Package type: leaded
- Package form: T-1¾
- Dimensions (in mm): Ø 5
- Leads with stand-off
- Peak wavelength: λ_p = 890 nm
- High reliability
- High radiant power
- High radiant intensity
- Angle of half intensity: φ = ± 10°
- Low forward voltage
- Suitable for high pulse current operation
- High modulation bandwidth: f_c = 12 MHz
- Good spectral matching with Si photodetectors
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

RoHS COMPLIANT GREEN (5-2008)**

Note

** Please see document "Vishay Material Category Policy": www.vishay.com/doc?99902

DESCRIPTION

TSHF5210 is an infrared, 890 nm emitting diode in GaAlAs double hetero (DH) technology with high radiant power and high speed, molded in a clear, untinted plastic package.

APPLICATIONS

- Infrared high speed remote control and free air data transmission systems with high modulation frequencies or high data transmission rate requirements
- Transmission systems according to IrDA requirements and for carrier frequency based systems (e.g. ASK/FSK - coded, 450 kHz or 1.3 MHz)
- Smoke-automatic fire detectors

After PCN – with surface emitting chip technology

TSHF5210

www.vishay.com

Vishay Semiconductors

High Speed Infrared Emitting Diode, 890 nm, Surface Emitter Technology

94 8390

FEATURES

- Package type: leaded
- Package form: T-1¾
- Dimensions (in mm): Ø 5
- Leads with stand-off
- Peak wavelength: λ_p = 890 nm
- High reliability
- High radiant power
- High radiant intensity
- Angle of half intensity: φ = ± 8°
- Low forward voltage
- Suitable for high pulse current operation
- Good spectral matching with Si photodetectors
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT HALOGEN FREE GREEN (5-2008)

DESCRIPTION

TSHF5210 is an infrared, 890 nm emitting diode based on surface emitter chip technology with high radiant power and high speed, molded in a clear, untinted plastic package.

APPLICATIONS

- Infrared high speed remote control and free air data transmission systems with high modulation frequencies or high data transmission rate requirements
- Transmission systems according to IrDA requirements and for carrier frequency based systems (e.g. ASK/FSK - coded, 450 kHz or 1.3 MHz)

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Page 1 of datasheet – Product summary

Pre PCN

PRODUCT SUMMARY				
COMPONENT	I_e (mW/sr)	φ (deg)	λ_p (nm)	t_r (ns)
TSHF5210	180	± 10	890	30

Note

- Test conditions see table "Basic Characteristics"

ORDERING INFORMATION			
ORDERING CODE	PACKAGING	REMARKS	PACKAGE FORM
TSHF5210	Bulk	MOQ: 4000 pcs, 4000 pcs/bulk	T-1¾

Note

- MOQ: minimum order quantity

After PCN – with surface emitting chip technology

PRODUCT SUMMARY				
COMPONENT	I_e (mW/sr)	φ (°)	λ_p (nm)	t_r (ns)
TSHF5210	327	± 8	890	10

Note

- Test conditions see table "Basic Characteristics"

ORDERING INFORMATION			
ORDERING CODE	PACKAGING	REMARKS	PACKAGE FORM
TSHF5210	Bulk	MOQ: 4000 pcs, 4000 pcs/bulk	T-1¾

Note

- MOQ: minimum order quantity

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Page 2 of datasheet – Abs. Max. Ratings and Derating

Pre PCN

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage		V_R	5	V
Forward current		I_F	100	mA
Peak forward current	t_p/T = 0.5, t_p = 100 µs	I_{FM}	200	mA
Surge forward current	t_p = 100 µs	I_{FSM}	1.5	A
Power dissipation		P_V	160	mW
Junction temperature		T_j	100	°C
Operating temperature range		T_{amb}	- 40 to + 85	°C
Storage temperature range		T_{stg}	- 40 to + 100	°C
Soldering temperature	t ≤ 5 s, 2 mm from case	T_{sd}	260	°C
Thermal resistance junction/ambient	J-STD-051, leads 7 mm, soldered on PCB	R_{thJA}	230	K/W

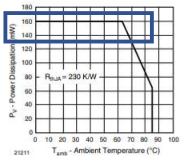
Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

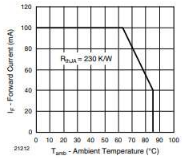
Fig. 2 - Forward Current Limit vs. Ambient Temperature

After PCN – with surface emitting chip technology

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage		V_R	5	V
Forward current		I_F	100	mA
Peak forward current	t_p/T = 0.5, t_p = 100 µs	I_{FM}	200	mA
Surge forward current	t_p = 100 µs	I_{FSM}	1	A
Power dissipation		P_V	170	mW
Junction temperature		T_j	100	°C
Ambient temperature range		T_{amb}	-40 to +85	°C
Storage temperature range		T_{stg}	-40 to +100	°C
Soldering temperature	t ≤ 5 s, 2 mm from case	T_{sd}	260	°C
Thermal resistance junction to ambient	J-STD-051, leads 7 mm, soldered on PCB	R_{thJA}	230	K/W

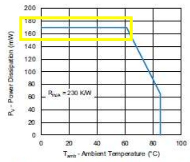
Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

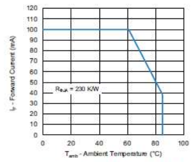
Fig. 2 - Forward Current Limit vs. Ambient Temperature

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Page 3 of datasheet – Basic Characteristics and Graphs

Pre PCN

BASIC CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Forward voltage	I_F = 100 mA, t_p = 20 ms	V_F		1.4	1.6	V
	I_F = 1 A, t_p = 100 µs	V_F		2.3		V
Temperature coefficient of V_F	I_F = 1 mA	TK_{VF}		- 1.8		mV/K
Reverse current	V_R = 5 V	I_R			10	µA
Junction capacitance	V_R = 0 V, f = 1 MHz, E = 0	C_j		125		pF
Radiant intensity	I_F = 100 mA, t_p = 20 ms	I_e	120	180	360	mW/sr
	I_F = 1 A, t_p = 100 µs	I_e		1800		mW/sr
Radiant power	I_F = 100 mA, t_p = 20 ms	ϕ_e		50		mW
Temperature coefficient of ϕ_e	I_F = 100 mA	$TK\phi_e$		- 0.35		%/K
Angle of half intensity		φ		± 10		deg
Peak wavelength	I_F = 100 mA	λ_p		890		nm
Spectral bandwidth	I_F = 100 mA	Δλ		40		nm
Temperature coefficient of λ_p	I_F = 100 mA	$TK\lambda_p$		0.25		nm/K
Rise time	I_F = 100 mA	t_r		30		ns
Fall time	I_F = 100 mA	t_f		30		ns
Cut-off frequency	I_{DC} = 70 mA, I_{AC} = 30 mA pp	f_c		12		MHz
Virtual source diameter		d		3.7		mm

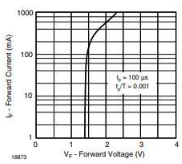
Fig. 4 - Forward Current vs. Forward Voltage

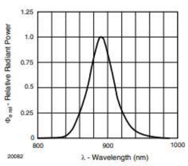
Fig. 7 - Relative Radiant Power vs. Wavelength

After PCN – with surface emitting chip technology

BASIC CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Forward voltage	I_F = 100 mA, t_p = 20 ms	V_F	-	1.5	1.7	V
	I_F = 1 A, t_p = 100 µs	V_F	-	3	3.4	V
Temperature coefficient of V_F	I_F = 100 mA, t_p = 20 ms	TK_{VF}	-	-0.8	-	mV/K
Reverse current		I_R	Not designed for reverse operation			µA
Junction capacitance	V_R = 0 V, f = 1 MHz, E = 0 mW/cm²	C_j	-	55	-	pF
Radiant intensity	I_F = 100 mA, t_p = 20 ms	I_e	150	327	450	mW/sr
	I_F = 1 A, t_p = 100 µs	I_e	-	2700	-	mW/sr
Radiant power	I_F = 100 mA, t_p = 20 ms	ϕ_e	-	53	-	mW
Temperature coefficient of ϕ_e	I_F = 100 mA	$TK\phi_e$	-	-0.3	-	%/K
Angle of half intensity		φ	-	± 8	-	°
Peak wavelength	I_F = 100 mA	λ_p	-	890	-	nm
Spectral bandwidth	I_F = 100 mA	Δλ	-	40	-	nm
Temperature coefficient of λ_p	I_F = 100 mA	$TK\lambda_p$	-	0.3	-	nm/K
Rise time	I_F = 100 mA	t_r	-	10	-	ns
Fall time	I_F = 100 mA	t_f	-	10	-	ns

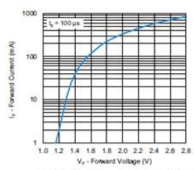
Fig. 3 - Forward Current vs. Forward Voltage

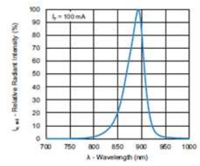
Fig. 7 - Relative Radiant Intensity vs. Wavelength

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Page 3 of datasheet – Graphs

Pre PCN	After PCN – with surface emitting chip technology

Pre PCN

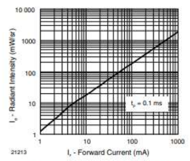

Fig. 5 - Radiant Intensity vs. Forward Current

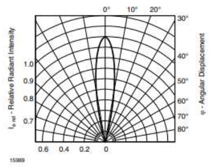

Fig. 8 - Relative Radiant Intensity vs. Angular Displacement

After PCN – with surface emitting chip technology

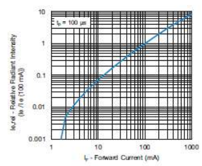

Fig. 4 - Relative Radiant Intensity vs. Forward Current

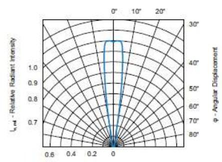

Fig. 8 - Relative Radiant Intensity vs. Angular Displacement

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Additional comments

Pre PCN

Following generic pulse handling graph deleted in datasheet, typical behaviors should be taken from App Note „Driving an Infrared Emitter in Steady and Pulsed Operating Modes (84155)“

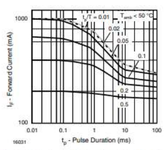

Fig. 3 - Pulse Forward Current vs. Pulse Duration

Following graph deleted in datasheet. It is covered by Graph Rel. Radiant intensity vs. Forward Current

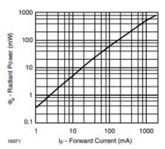

Fig. 6 - Radiant Power vs. Forward Current

After PCN – with surface emitting chip technology

Following graphs added to datasheet

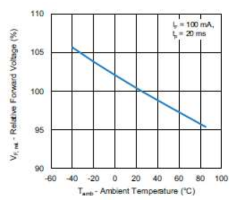

Fig. 4 - Relative Forward Voltage vs Ambient Temperature

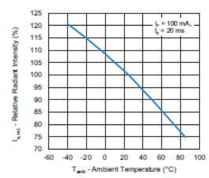

Fig. 6 - Relative Radiant Intensity vs. Ambient Temperature

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TSHF5410 / TSHF6410 PCN

Key message:

- Slightly bigger angle of half intensity
- Same radiant power
- Slightly lower radiant intensity
- Higher forward voltage
- No change in package dimensions

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Page 1 of datasheet - Introduction

Pre PCN

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TSHF5410

Vishay Semiconductors

High Speed Infrared Emitting Diode, 890 nm, GaAlAs Double Hetero

94 8390

FEATURES

- Package type: leaded
- Package form: T-1¾
- Dimensions (in mm): Ø 5
- Leads with stand-off
- Peak wavelength: λ_p = 890 nm
- High reliability
- High radiant power
- High radiant intensity
- Angle of half intensity: $\varphi = \pm 22°$
- Low forward voltage
- Suitable for high pulse current operation
- High modulation bandwidth: f_c = 12 MHz
- Good spectral matching with Si photodetectors
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

RoHS COMPLIANT GREEN (5-2008)**

Note

** Please see document "Vishay Material Category Policy": www.vishay.com/doc?99902

DESCRIPTION

TSHF5410 is an infrared, 890 nm emitting diode in GaAlAs double hetero (DH) technology with high radiant power and high speed, molded in a clear, untinted plastic package.

APPLICATIONS

- Infrared high speed remote control and free air data transmission systems with high modulation frequencies or high data transmission rate requirements
- Transmission systems according to IrDA requirements and for carrier frequency based systems (e.g. ASK/FSK - coded, 450 kHz or 1.3 MHz)

After PCN – with surface emitting chip technology

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TSHF5410

Vishay Semiconductors

High Speed Infrared Emitting Diode, 890 nm, Surface Emitter Technology

94 8390

FEATURES

- Package type: leaded
- Package form: T-1¾
- Dimensions (in mm): Ø 5
- Leads with stand-off
- Peak wavelength: λ_p = 890 nm
- High reliability
- High radiant power
- High radiant intensity
- Angle of half intensity: ± 27°
- Low forward voltage
- Suitable for high pulse current operation
- Good spectral matching with Si photodetectors
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT HALOGEN FREE GREEN (5-2008)

DESCRIPTION

TSHF5410 is an infrared, 890 nm emitting diode based on surface emitter chip technology with high radiant power and high speed, molded in a clear, untinted plastic package.

APPLICATIONS

- Infrared high speed remote control and free air data transmission systems with high modulation frequencies or high data transmission rate requirements
- Transmission systems according to IrDA requirements and for carrier frequency based systems (e.g. ASK/FSK - coded, 450 kHz or 1.3 MHz)

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Page 1 of datasheet – Product summary

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Pre PCN

PRODUCT SUMMARY

COMPONENT	I_e (mW/sr)	φ (deg)	$λ_p$ (nm)	t_r (ns)
TSHF5410	70	± 22	890	30

Note
- Test conditions see table "Basic Characteristics"

ORDERING INFORMATION

ORDERING CODE	PACKAGING	REMARKS	PACKAGE FORM
TSHF5410	Bulk	MOQ: 4000 pcs, 4000 pcs/bulk	T-1¾

Note
- MOQ: minimum order quantity

After PCN – with surface emitting chip technology

PRODUCT SUMMARY

COMPONENT	I_e (mW/sr)	φ (°)	$λ_p$ (nm)	t_r (ns)
TSHF5410	62	± 27	890	10

Note
- Test conditions see table "Basic Characteristics"

ORDERING INFORMATION

ORDERING CODE	PACKAGING	REMARKS	PACKAGE FORM
TSHF5410	Bulk	MOQ: 4000 pcs, 4000 pcs/bulk	T-1¾

Note
- MOQ: minimum order quantity

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Page 2 of datasheet – Abs. Max. Ratings and Derating

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Pre PCN

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage		V_R	5	V
Forward current		I_F	100	mA
Peak forward current	$t_p/T = 0.5$, $t_p = 100$ µs	I_{FM}	200	mA
Surge forward current	$t_p = 100$ µs	I_{FSM}	1.5	A
Power dissipation		P_V	160	mW
Junction temperature		T_j	100	°C
Operating temperature range		T_{amb}	- 40 to + 85	°C
Storage temperature range		T_{stg}	- 40 to + 100	°C
Soldering temperature	t ≤ 5 s, 2 mm from case	T_{sd}	260	°C
Thermal resistance junction/ambient	J-STD-051, leads 7 mm, soldered on PCB	R_{thJA}	230	K/W

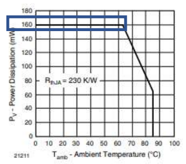

Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

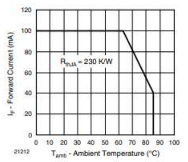

Fig. 2 - Forward Current Limit vs. Ambient Temperature

After PCN – with surface emitting chip technology

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage		V_R	5	V
Forward current		I_F	100	mA
Peak forward current	$t_p/T = 0.5$, $t_p = 100$ µs	I_{FM}	200	mA
Surge forward current	$t_p = 100$ µs	I_{FSM}	1	A
Power dissipation		P_V	170	mW
Junction temperature		T_j	100	°C
Ambient temperature range		T_{amb}	-40 to +85	°C
Storage temperature range		T_{stg}	-40 to +100	°C
Soldering temperature	t ≤ 5 s, 2 mm from case	T_{sd}	260	°C
Thermal resistance junction to ambient	J-STD-051, leads 7 mm, soldered on PCB	R_{thJA}	230	K/W

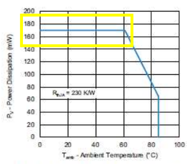

Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

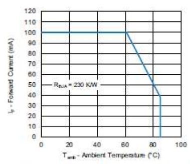

Fig. 2 - Forward Current Limit vs. Ambient Temperature

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Page 3 of datasheet – Basic Characteristics and Graphs

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Pre PCN

BASIC CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Forward voltage	I_F = 100 mA, t_p = 20 ms	V_F		1.4	1.6	V
	I_F = 1 A, t_p = 100 μs	V_F		2.3		V
Temperature coefficient of V_F	I_F = 1 mA	TK_{VF}		- 1.8		mV/K
Reverse current	V_R = 5 V	I_R			10	μA
Junction capacitance	V_R = 0 V, f = 1 MHz, E = 0	C_j		125		pF
Radiant intensity	I_F = 100 mA, t_p = 20 ms	I_e	45	70	135	mW/sr
	I_F = 1 A, t_p = 100 μs	I_e		700		mW/sr
Radiant power	I_F = 100 mA, t_p = 20 ms	ϕ_e		50		mW
Temperature coefficient of ϕ_e	I_F = 100 mA	$TK\phi_e$		- 0.35		%/K
Angle of half intensity		φ		± 22		deg
Peak wavelength	I_F = 100 mA	λ_p		890		nm
Spectral bandwidth	I_F = 100 mA	Δλ		40		nm
Temperature coefficient of λ_p	I_F = 100 mA	$TK\lambda_p$		0.25		nm/K
Rise time	I_F = 100 mA	t_r		30		ns
Fall time	I_F = 100 mA	t_f		30		ns
Cut-off frequency	I_{DC} = 70 mA, I_{AC} = 30 mA pp	f_c		12		MHz
Virtual source diameter		d		2.1		mm

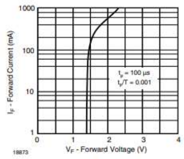

Fig. 4 - Forward Current vs. Forward Voltage

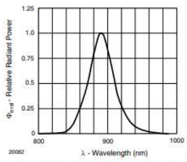

Fig. 7 - Relative Radiant Power vs. Wavelength

After PCN – with surface emitting chip technology

BASIC CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Forward voltage	I_F = 100 mA, t_p = 20 ms	V_F	-	1.5	1.7	V
	I_F = 1 A, t_p = 100 μs	V_F	-	3	3.4	V
Temperature coefficient of V_F	I_F = 100 mA, t_p = 20 ms	TK_{VF}	-	-0.8	-	mV/K
Reverse current		I_R	Not designed for reverse operation			μA
Junction capacitance	V_R = 0 V, f = 1 MHz, E = 0 mW/cm²	C_j	-	55	-	pF
Radiant intensity	I_F = 100 mA, t_p = 20 ms	I_e	40	62	120	mW/sr
	I_F = 1 A, t_p = 100 μs	I_e	-	528	-	mW/sr
Radiant power	I_F = 100 mA, t_p = 20 ms	ϕ_e	-	53	-	mW
Temperature coefficient of ϕ_e	I_F = 100 mA	$TK\phi_e$	-	-0.3	-	%/K
Angle of half intensity		φ	-	± 27	-	°
Peak wavelength	I_F = 100 mA	λ_p	-	890	-	nm
Spectral bandwidth	I_F = 100 mA	Δλ	-	40	-	nm
Temperature coefficient of λ_p	I_F = 100 mA	$TK\lambda_p$	-	0.3	-	nm/K
Rise time	I_F = 100 mA	t_r	-	10	-	ns
Fall time	I_F = 100 mA	t_f	-	10	-	ns

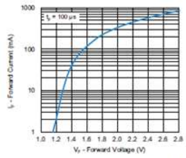

Fig. 3 - Forward Current vs. Forward Voltage

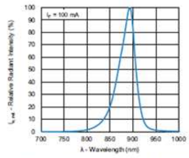

Fig. 7 - Relative Radiant Intensity vs. Wavelength

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Page 3 of datasheet – Graphs

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Pre PCN

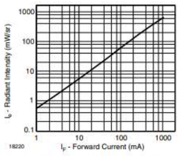

Fig. 5 - Radiant Intensity vs. Forward Current

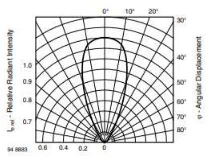

Fig. 8 - Relative Radiant Intensity vs. Angular Displacement

After PCN – with surface emitting chip technology

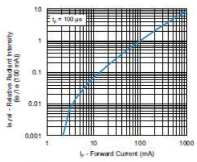

Fig. 4 - Relative Radiant Intensity vs. Forward Current

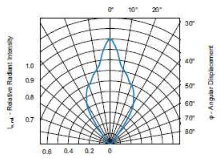

Fig. 8 - Relative Radiant Intensity vs. Angular Displacement

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Additional comments

Pre PCN	After PCN – with surface emitting chip technology
Following generic pulse handling graph deleted in datasheet, typical behaviors should be taken from App Note „Driving an Infrared Emitter in Steady and Pulsed Operating Modes (84155)“	Following graphs added to datasheet

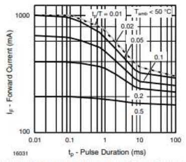

Fig. 3 - Pulse Forward Current vs. Pulse Duration

Following graph deleted in datasheet. It is covered by Graph Rel. Radiant intensity vs. Forward Current

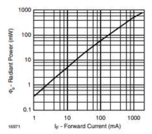

Fig. 6 - Radiant Power vs. Forward Current

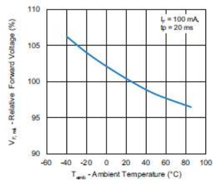

Fig. 4 - Forward Voltage vs. Ambient Temperature

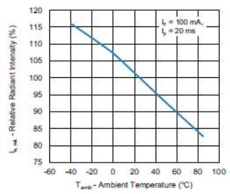

Fig. 6 - Relative Radiant Intensity vs Ambient Temperature

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Thank you

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