	Technical Specification Sheet 190 — 9237.998.18101 / 9237.996.18101 9237.952.18101 9237.953.18101 / 9237.953.11101 9237.989.18101 / 9237.989.11101	Version
		1.0

Content Information:

Product Information	
Product Category	LED Retrofits
12 NC	9237.998.18101 / 9237.996.18101 9237.952.18101 9237.953.18101 / 9237.953.11101 9237.989.18101 / 9237.989.11101
Product Model	W21_W21/5_P21_P21/5_P27/7 Red Nafta

Version	Change Details	Originator	Checker1	Checker2	Approver1	Approver2	DCC	Release Date
1.0	Initial release	Ronnie HU						

1. Purpose

Set up a new entry range including T10, T16, T20, Festoon targets at AM for NAFTA, to expand our portfolio in signalingfunction address the need of “affordable styling”. This could be penetration on volume market which request lower cost/performance.

2. Scope

This file covers T20 Red, including (P21, P21/5, W21, W21/5, P27/7)


Product Group	12NC	Description
W21 Red	923799818101	T-6 (1/2) LED 7440R ULR 12V X2
W21/5 Red	923799618101	T-6 (1/2) LED 7443R ULR 12V X2
P21 Red	923795218101	S-8 LED 1156R ULR 12V X2
P21/5 Red	923795318101	S-8 LED 1157R ULR 12V X2
P21/5 Red	923795311101	S-8 LED 2357R ULR 12V X2
P27/7 Red	923798918101	S-8 LED 3157R ULR 12V X2
P27/7 Red	923798911101	S-8 LED 4057R ULR 12V X2

3. Responsibility


This specification is owned by Mobility R&D

Technical Project Leader (TPL) is responsible for creation, implementation of this document. He/She is the primary contact for any issue pertaining to documents under their ownership. (Refer to the O1 Process)
 QPL and IPL are the checker who is responsible for review the document content, interfaces, version and format.

R&D Manager, Quality Manager are responsible for review and approval of this form (Refer to the O1-T-002)
 Document Control Center (DCC) should be sign the document after approval and release


	Technical Specification Sheet 190 — 9237.998.18101 / 9237.996.18101 9237.952.18101 9237.953.18101 / 9237.953.11101 9237.989.18101 / 9237.989.11101	Version
		1.0

1. GENERAL REQUIREMENTS	
Commercial type	W21 ; W21/5 ; P21 ; P21/5 ; P27/7 Red
Application	Stop/Tail/Exterior lighting
Luminaire dimension restriction	P27/7 : Ø20 x 49.8 mm W21/5 & W21 : Ø20 x 43.9 mm P21/5 & P21 : Ø20 x 48.8 mm
Claimed replacement	-
Rated Power (typical)	Minor : 0.4W Major+ Minor : 2.7W
Rated Voltage (range)	12V (9~16V)
Rated Frequency (range)	DC input
Rated Current (max./range)	Minor : 30mA Major+ Minor : 200mA
Power factor (min.)	-
Rated Lumen (typical)	Minor : 13lm +/-20% (1min) 10lm +/-20% (30min) Major+ Minor : 80lm+/-20% (1min) 18lm+/-20% (30min)
Lamp Base	P27/7 : W2.5x16q W21/5 : W3x16q , W21 : W3x16d P21/5 : BAY15d , P21 : BA15S
Center ring Type	-
Lamp Type (size)	-
Outline compliant?	-
Rated MBCP (typical)	-
Rated CCT	Red light
Rated CRI (typical)	-
LED position requirement E value (x-direction)	-
LED position in Z direction (LH+RH)	-
LED position in Y direction (LH+RH)	-
f (Length of 4 LED chips)	-

	Technical Specification Sheet 190 — 9237.998.18101 / 9237.996.18101 9237.952.18101 9237.953.18101 / 9237.953.11101 9237.989.18101 / 9237.989.11101	Version 1.0
---	---	----------------------------------


1. GENERAL REQUIREMENTS	
MOL (max)	Ref.110
MOD (max)	Ref.110
Weight (max)	-
Rated Lifetime (L70Tc * @25°C)	3000hrs
Dimmability	-
Transformer Compatibility	-
Starting time	-
Mass production burn in test	NA
Mass production burn in Switching cycle	NA
Wireless technology	-
SSL7A compliant? Type of LLE	-
Approbation	ELV/ RoHS, REACH, PVC free, waiver BFR free

2. ELECTRICAL SPECIFICATION				
Name	Value	Unit	Tolerance	Remarks
Voltage	12	V	9~16	
Current	Minor : 0.03 Major+ Minor : 0.2	A	±15%	@13.5V 25°C,
Power	Minor : 0.4 Major+ Minor : 2.7	W	±15%	@13.5V 25°C,
Frequency	N/A	Hz	-	
Lamp power factor	N/A	-	Avg. Min.	
Displacement factor (Cos(φ))	N/A	-	Min	
Total Harmonic Distortion (THD)	N/A			
3 rd Harmonic current		-	Max	
5 th Harmonic current			Max	
Inrush current	N/A	-	Avg.	Connected to 10 ET (Avg of PK value)
Start-up time	N/A	-	Max	

	Technical Specification Sheet 190 — 9237.998.18101 / 9237.996.18101 9237.952.18101 9237.953.18101 / 9237.953.11101 9237.989.18101 / 9237.989.11101	Version 1.0

2. ELECTRICAL SPECIFICATION				
Name	Value	Unit	Tolerance	Remarks
Warm-up time to 95% luminous flux	N/A	S	Typ. Max.	
LED operation frequency	N/A	Hz	Typ	ref
Efficiency VS mains voltage	N/A	-	-	Refer to following graph
Output current VS mains voltage	N/A	-	-	Refer to following graph
Lumen output/power/CCT/ Current VS Halogen	-			

3. PHOTOMETRICAL AND COLOR SPECIFICATION				
Name	Value	Unit	Tolerance	Remarks
Beam angle	>120	degree	±3	
Lumen output	Minor:13/10	lm	Typ.	@ 1min/@30min
	Major+ Minor :80 / 18	lm		
	Minor:15.6 / 12	lm	Max.	
	Major+ Minor :96 / 21.6	lm		
Useful lumen output (in 90° cone)	Minor:10.4 / 8	lm	Min.	
	Major+ Minor :64 / 14.4	lm		
	-	lm	Avg. Max. Min.	
Lumen efficacy	Minor:32 Major+ Minor : 30	lm/W	Typ.	Only for ref
Useful Lumen efficacy (in 90° cone)	N/A	lm/W	Typ. Min.	
Energy Efficiency Index	N/A	-	Typ.	
Maximum luminous intensity	N/A	Cd	Typ.	
		Cd	Min.	

	Technical Specification Sheet 190 — 9237.998.18101 / 9237.996.18101 9237.952.18101 9237.953.18101 / 9237.953.11101 9237.989.18101 / 9237.989.11101	Version 1.0
---	---	----------------------------------


3. PHOTOMETRICAL AND COLOR SPECIFICATION

Name	Value	Unit	Tolerance	Remarks
Color Characteristics CCT	615~645	nm	-	
Color rendering index (Ra)	N/A	-	Min.	
Color rendering index (R9)	N/A	-	Min.	
Color Angular Uniformity Δu'v'	N/A	-	Max	
Dimming MaxLOR (Maximum Light Output Ratio)	N/A	%	Min	
Dimming MinLOR (Minimum Light Output Ratio)	N/A	%	Max	
Flicker index	N/A	-	Max	
Percent flicker	N/A	%	Max	
ETLOR-Elevated Temperature Light Output Ratio	N/A	%	Min.	
Light distribution	N/A	-	-	
Spectral power distribution (200-800nm)	N/A	-	-	
Beam pattern	N/A			

All the items are tested according to CIE-127-2007


4. RELIABILITY REQUIREMENTS

Name	Value	Unit	Tolerance	Remarks
Lifetime (L70 Tc @25°C)	3000	hour	Typ.	L70 TC means the time when 63.2% bulbs lumen decrease to 70% of original
Failure Rate F1(=B1)	-	hour	Typ.	


	Technical Specification Sheet 190 — 9237.998.18101 / 9237.996.18101 9237.952.18101 9237.953.18101 / 9237.953.11101 9237.989.18101 / 9237.989.11101	Version
		1.0

4. RELIABILITY REQUIREMENTS				
Name	Value	Unit	Tolerance	Remarks
Failure Rate F2(=B3)	-	hour	Typ.	
Failure Rate F10(=B10)	1500	hour	Typ.	
Failure Rate @6000h	-	-	Typ.	
Lumen maintenance	-	-	Typ.	
Lumen maintenance @6000h	-	-	Typ.	
Colour maintenance (NAM, Energy Star) $\Delta u'v' @ 6000h$	-	-	Max	
(IEC 62612) @ 3000h		SDCM	Max	
@ 6000h		SDCM	Max	
CRI maintenance				
@ 3000h	-	-	Min.	
@ 6000h	-	-	Min.	

4. RELIABILITY REQUIREMENTS		Acceptance criteria
Mechanical vibration test	IEC 60180 B.3 table	The DUT must be fully functional before, during and after the test, and all parameters must meet the specifications.
Low temperature storage	refer to B.3 table parameter	Visual check, electrical check and function check is minimum C after 2hrs reaching room temperature 1st step is 24hrs storage for PF; 2nd step to continue to 1000hrs (follow OEM requirement) and update the status in CA/CR/MPR
Low temperature operation	from Trm to Tmin: 25C to -40°C the transition <=1K/min (IEC60068-2-2B) operation mode: 1.1 time from -40C to 25C depend on oven ability (no specify)	Visual check, electrical check and function check is minimum C after 2hrs reaching room temperature 1st step is 24hrs storage for PF; 2nd step to continue to 1000hrs (follow OEM requirement) and update the status in CA/CR/MPR
High temperature storage	at a temperature of 85 °C unless otherwise specified in the DUT specification The operating mode of the DUT is 1.1	Visual check, electrical check and function check, lumen decay <30% after 2hrs reaching room temperature 1st step is 48hrs storage for PF; 2nd step to continue to 1000hrs (follow OEM requirement) and update the status in CA/CR/MPR
Climatic sequence	Initial test first, then Temperature = -10°C ~-65°C Humidity = RH 80~96%. Status : 5.5hrs ON, 2hrs OFF, 7.5hrs ON, 2hrs OFF, 3.5hrs ON, 3.5hrs OFF, 3hrs ON as 1 cycle total test: 10 cycles 240hrs	after the test, lumen decay < 30%

	Technical Specification Sheet 190 — 9237.998.18101 / 9237.996.18101 9237.952.18101 9237.953.18101 / 9237.953.11101 9237.989.18101 / 9237.989.11101	Version 1.0

4. RELIABILITY REQUIREMENTS		Acceptance criteria
Room Temperature Operating Life (RTOL)	13.5V/ambient (25°C) 1. test to 2000hr or claimed value which ever longer; 3. Continue test to fail at discursion of reliability data analyst. Default decision continue. ON/OFF : 45min on 15min off	1. test to claimed value, goal is all samples decay <30% (L70Tc). In case that samples do not pass full 8D must be done including corrective action. 3. test to fail, Record failure mode and FA
High temperature operating Life (HTOL ON/OFF) (85C)	13.5V/85°C for 500hr; Cycle: 15min ON & 15min OFF	1) Test to 500hrs, all samples lumen decay <30%, within initial color and electrical specification (L70) while keep updating the status during reporting point 2) Continue test until 50% of parts fail. Do FA per failure mode and compare failure modes to HAST test. A) If no new failure modes and failure time consistent with HAST then simply record in failure mode book.
thermal shock test	thermal shock test	thermal shock test
Accelerated High temperature operating Life (HTOL ON/OFF)	13.5V, oven setting 120°C for 500hr to see the failure mode at extrema usage condition continue to test to fail ON	1) Test to 50hrs, all samples lumen decay <30%, within initial color and electrical specification (L70) while keep updating the status during reporting point 2) Continue test until 50% of parts fail. Do FA per failure mode and compare failure modes to HAST test. A) If no new failure modes and failure time consistent with HAST then simply record in failure mode book.
Accelerated High temperature operating Life (HTOL ON)	13.5V, oven setting 120C, key IC temperature can reach 125°C for 380hrs	1) Test to 250hrs, all samples lumen decay <30%, within initial color and electrical specification (L70) 2) Continue test until 50% of parts fail. Do FA per failure mode and compare failure modes to HAST test. A) If no new failure modes and failure time consistent with HAST then simply record in failure mode book.
Accelerated Wet High temperature operating Life (WHTOL ON/OFF)	13.5V/65°C/85%RH for 380hrs	1) Test to targethrs, all samples lumen decay <30%, (L70) pass PF 2) Continue test until 50% of parts fail. Do FA per failure mode and compare failure modes to HAST test. A) If no new failure modes and failure time consistent with HAST then simply record in failure mode book.
Highly Accelerated Wet High temperature operating Life (AOO2 ON/OFF)	13.5/ 105C/100%RH until >80% fail Cycle: 15min ON & 15min OFF	1) Test to Fail 2) Assume acceleration factor of 40x unless product specific acceleration factor prediction exists. 3) Record failure mode and FA on all 10 bulbs into Product Reliability Book.
Highly Accelerated wet high temperature operating life (WHOTL ON/OFF)	13.5V 65%85C until >80% fail Cycle: 15min ON & 15min OFF	1) Test to Fail 2) Assume acceleration factor of 40x unless product specific acceleration factor prediction exists. 3) Record failure mode and FA on all 10 bulbs into Product Reliability Book.
Free fall test	– number of DUT: 3; – falls per DUT: 2; – drop height: 1 m free fall or the height of handling in accordance with agreement; – impact surface: concrete ground or steel plate; – orientation of the DUT: 1st fall of each DUT at a different dimensional axis; 2nd fall with the given DUT at the same dimensional axis, but on the opposite side of the housing; – operating mode of the DUT: 1.1 (see ISO 16750-1); – temperature: shall be agreed between customer and supplier.	– The DUT shall be visually examined after the falls. – Hidden damage is not permitted. – Minor damage of the housing is permitted as long as this does not affect the performance of the DUT. – Proper performance shall be proven following the test. Functional status shall be class C as defined in ISO 16750-1.
Temperature Equivalent Δteq	rated voltage, burn in 1hrs, test Tj	Tj<Max. of LED
Lamp base temperature test (benchmark to HAL)	checking the temperature of base in socket burning 30min	comparable to hal lamp
Infant failure evaluation (500pcs check)	13.5V DC on burn in hrs depend on lamp type (for car runniing 20K Km) =220hrs	1) Maximum 2 failures <70% initial lumens within electrical and color specifications at 20kkm to pass CA. 2) 100 Bulbs for archive(20 from each production run). Remaining 900 bulbs can not be sold, but can be used for demo and product promotion.


	Technical Specification Sheet 190 — 9237.998.18101 / 9237.996.18101 9237.952.18101 9237.953.18101 / 9237.953.11101 9237.989.18101 / 9237.989.11101	Version
		1.0

5. SAFETY, EMC, RF REQUIREMENTS

Name	Description
IP level	No requirement
Lamp dimension	Refer to sheet 110
Pin press strength	N/A (to define the spec for the directly insert base structure)
Pin pull strength	N/A (to define the spec for the directly insert base structure)
Fan connector pull strength (fan)	N/A
LED chip side connector pull strength	N/A
Torque of heatsink assembly	N/A
Torque of center ring	N/A
Bending moment	N/A
Cap gauge test	N/A
Length of wire connect burner and heatsink	N/A
OTP start-up	N/A
OTP close	N/A
Dimmer Safety	N/A
HiPOT test	N/A
Insulation resistance	N/A
Direct insert to the main source	N/A
Eye safety	N/A
EMC compliance	ECE R10
RF compliance	NA
EMF compliance	NA
Beam Pattern	Y

6. ENVIRONMENTAL REQUIREMENTS

Name	Description	Applicable Yes/No?

	Technical Specification Sheet 190 — 9237.998.18101 / 9237.996.18101 9237.952.18101 9237.953.18101 / 9237.953.11101 9237.989.18101 / 9237.989.11101	Version
		1.0

6. ENVIRONMENTAL REQUIREMENTS		
Name	Description	Applicable Yes/No?
ELV	2000_53_E ELV	Y
China auto RoHS	GB 30512-2014	N
Energystar Toxics Reduction	ENERGY STAR® Program Requirements Product Specification for Lamps (Light Bulbs) Version 1.0	N/A
REACH	European Directive 1907/2006/EC	Y
PVC free	Philips internal standard (RSL)	Y
Other hazardous substances (BRF, etc)	Philips internal standard (RSL)	Y
Lamp acoustic level	24.5 dBA Typ. (For reference) 34.5 dBA Max. (For reference) 50cm away Test condition: In 13.2V DC source, measured in sound power level.	N
Dust density requirement	N/A	N