USB MOBILE CHARGING SOCKET TYPE-A & TYPE-C (HIGH CAPACITY)

1. SCOPE

1.1 This specification covers the design, manufacture, supply of USB mobile charging socket for LHB Type coaches.

1.2 The quality of the USB charger as a whole shall be of International Standards.

1.3 The firm shall maintain date-wise in-house quality control system and in-house quality control records etc. for in-stage inspection and testing and the same shall be made available to the inspecting official during testing.

1.4 Firm shall submit clause by clause technical details during tendering stage for technical scrutiny of the offer.

2.0 SERVICE CONDITIONS

2.1 The USB charger governed by this specification shall be suitable for following service conditions:-

Ambient	- 5 to55 deg. C
Train speed	200 KMPH
Humidity	Up to 98% during the rainy season
Altitude	Max.1200m above sea level
Atmosphere	Extremely dusty and desert terrain in certain areas. The dust concentration in the air may reach at the high value of 1.6mg/cubic meter.
Rainfall	Very dusty atmosphere with fog, case iron dust of brake block shoe, flying ballast etc. Very heavy in certain areas.
Coastal area	The equipment shall be designed to work in humid salt laden and corrosive atmosphere. The maximum values of the condition shall be as under:
Maximum Ph value	8.5
Sulphate	7mg/litre
Max. concentration of Chlorine	6mg/litre
Max. Conductivity	130sq/cm
Vibration	The arrangement system and their mounting arrangement shall be capable to withstand satisfactorily the vibration and shocks encountered in service as specified below.

Maximum vertical acceleration	3.0 g
Maximum lateral acceleration	3.0 g
Maximum longitudinal acceleration	3.0 g

Sinusoidal from of vibration, the frequency 'f' lies between 1 Hz and 50 Hz and their amplitude 'a' expressed in mm is given as a function 'f' by the equation.

$a=25/f$ for the values of 'f' between 1 Hz and 10 Hz.
$a=250/f^2$ for the values of 'f' between 10 Hz and 100 Hz.

3.0 Government specifications

3.1 Reference shall be made to the following standard specifications:-

IS:13252 (part-1)/IEC-60950-1	Information Technology Equipment- Safety
IEC60571	Electronic equipment used in Railway vehicle
ELRS/SPEC/SPEC/S1/0015 (Rev-1) Oct-2011 or Latest	Specification of electronics used in Rolling Stock application
UIC IEC 68-2-30	Basic environment testing procedure
IEC-61373	Shock & vibration tests for rolling stock application.
IEC-61000	Electromagnetic compatibility (EMC)
IEC-60529	Classification of Degree of Protection
EN 45545	European Railway Standard for fire safety
IEC 62680-1-3	Universal serial Bus Interface for Data & Power

4.0 ELECTRICAL PARAMETERS:

i.	Mobile Charging Technology/Protocol	Power delivery (PD) & Programmable Power supply (PPS)
ii.	Input Voltage	110 V AC ± 5% Single phase (50 Hz ±3%) 110 V DC (30% Ripple)
iii.	Operating Voltage Range	90-140V AC/DC
iv.	Output Voltage & Current range	• Type-A= 5VDC, 2A (10W max) • Type-C (PD)= 5VDC, 3A (15W max)/ 9.0 V, 3 A (27 W Max)/ 12.0 V, 3A (PPS)=3.3-15.5 V, 2.25 A (7.5-35 W)
v.	Wattage	35W ± 5 % for Dual port USB (Ty- A&C)
vi.	Driver Efficiency	>80%
vii.	Electrical protection	Open Loop , Short Circuit , Under Voltage , Overvoltage, Surge upto 4 KV, Thermal Overload

5.0 TECHNICAL REQUIREMENTS

5.1 The USB charging socket shall be as per USB 3.0 compliant and shall be conforming the safety requirement as per IS:13252 (part-1)/IEC-60950-1.

5.2 The Pin assignment shall be as per Respective IEC/International standards for charging only

5.3 There shall be one electronic module equipped with driving USB socket. This shall be capable of charging mobiles of all types. These modules shall be capable of working

as per requirement at clause-4 (iii). These modules shall be incompatible to work with any other type of supply voltage except mentioned above. Proper inrush current limiting and input filters shall be incorporated at the input stage.

5.4 The electronic component shall be used as follows.

a) All electronic component used the circuit shall be of industrial grade or above.
b) Metallic film/Paper/polyester capacitor shall be rated for 105° C or above.
c) The resistor shall be preferably made of metal film/Chip resistor adequate rating. The actual loading versus rating shall be 3.
d) The junction temperature of the switching devices such as transistors and MOSFETs etc. shall not exceed 125° C allowing thermal margin of 25° C.
e) The protective cum adhesive coating (fire retardant) used on PCB shall be clear and transparent and shall not affect colour code of electronic equipment or the product code of the company.
f) The heavy component shall be properly fixed. The solder connection should be with good finish. The electronic circuits, PCB and component shall meet the requirement of RDSO specification no. ELRS/SPEC/SPEC/S1/0015 (Rev-1) Oct-2011 or Latest for Electronics used in Rolling Stock Application. The electronics covered in this equipment shall pass all the tests called for in the specification.

5.5 The USB charging point shall be able to sustain a DC/AC input of 250V at input for 2 minutes. There shall be no damage in any of component during this period.

5.6 There shall not be any electrolytic capacitors or electromagnetic relay used in the circuits either at the input or at the output sides. All the components used in the unit shall be halogen free and fire retardant only.

5.7 The USB charging point shall be galvanically isolated from mains DC and shall be compatible with all types and capacity of mobile phones. The individual USB shall follow a definite charging profile with current limit as per respective type of connectors tabled at clause 4. The overall short circuit current shall be limited in USB by less than 06 Amps.

5.8 The USB charging point shall be thermal overload and short circuit protected. The unit shall shut down and restart after any such fault.

5.9 There shall be no switch/LED indication for ON/OFF the USB.

5.10 The output voltage shall have tolerance as per Clause 4 of specification.

5.11 Design and construction of USB shall be of sturdy and self-protected type and suitable for rough usage.

5.12 The complete assembly shall be fire retardant standard HL-3 of EN 45545.

5.13 USB port and PCB shall be reliable and as per RDSO specification no. ELRS/SPEC/SPEC/S1/0015 (Rev-1) Oct-2011 or Latest confirming to international standards

5.14 The USB mobile charging housing shall be of fire-retardant polycarbonate having IP65 protection.

5.15 The Overall size of the USB mobile charging socket housing shall be as per RCF SKED 959 for both Type-I (Screwed type) & Type – II (snap Fit Type).

The USB charging module shall be suitable for fitment into two module switch plate assembly for provision in place of/replacement of existing 3/5 pin mobile charging socket

5.16 General arrangement shall be as under:

5.16.1 The distance between TYPE-A & TYPE-C sockets shall be adequate to avoid the infringement of USB Plugs during use of both types of Charging Points.

5.16.2 The Fitment /mountings of the USB charging Socket Type-A & C module on Switch Plates (2 module) shall be one to one replacement or by use of adapter plate, with similar makes of Switch Plates Assemblies with only the dimensions shall be as per LW74202 Alt"f".

5.16.3 There shall be no restrictions for provision of Type-A & Type-C charging points on the front sides at either Locations (i.e. on above or Below or side by side). The location mentioned in the reference drawing is for guidance only.

5.16.4 The Cable Entry on the USB module shall be on the side of the module and towards switch for ease of connections.

5.16.5 Firm shall use both charging Protocol Technology - Power delivery (PD) & Programmable Power supply (PPS) Technology suitable for fast Charging.

6.0 TESTS:

6.1 TYPE TEST:

The type test shall be carried out as per clause 6.4 to prove confirmation with the requirement of specification and general quality/design features of the unit. The firm manufacturing for the first time shall get the prototype approval from CEDE/RCF/ICF.

6.2 ROUTINE TEST:

The routine tests mentioned in the clause shall be carried out on each unit by the manufacture at his works to ensure compliance with the specifications and the drawings.

6.3 ACCEPTANCE TEST:-

Acceptance test mentioned in the clause are to be carried out by an inspecting authority nominated by the purchaser at the works of the manufacturer, on the samples picked up by the inspecting authority. All the acceptance tests shall be carried out at the firm's premises at the manufacturer's cost. Inspecting officer will witness the tests. A copy of the internal tests conducted by the firm shall be supplied to the inspecting/purchasing authority

6.4 Following tests shall be conducted on the unit:

	Test Description	Type test	Routine test	Acceptance test
i.	Visual inspection	Yes	Yes	Yes
ii.	Checking of purchase document of USB	Yes	Yes	Yes
iii.	Insulation resistance test	Yes	Yes	Yes
iv.	High voltage/dielectric test	Yes	Yes	Yes
v.	Over voltage protection	Yes	Yes	Yes
vi.	Short circuit protection	Yes	-	-

vii.	Surge protection	Yes	-	-
viii.	Reverse polarity test	Yes	Yes	Yes
ix.	Temperature rise test	Yes	-	-
x.	Fire retardant test	Yes	-	-
xi.	IP Protection test	Yes	-	-
xii.	Vibration shock and impact test	Yes	-	-
xiii.	Environmental test	Yes	-	-
xiv.	EMI/EMC test	Yes	-	-
xv.	Endurance test	Yes	-	-

6.5 VISUAL INSPECTION:-

The unit shall be checked visually for general workmanship and rating and make of electronic items. Documents shall also be verified.

6.6 CHECKING OF PURCHASE DOCUMENTS:-

Documents purchase of USB with bill of material shall be checked and verified.

6.7 INSULATION RESISTANCE TEST:-

The Insulation resistance of the unit between current carrying parts shorted together shall not be less than 100MΩ at 60^{o} RH when measured with 500V Megger before and after H.V. test.

6.8 HIGH VOLTAGE/ DIELECTRIC TEST:-

Immediately after insulation resistance test, an AC voltage of 1.72 kV r.m.s. of sine waveform of 50 Hz shall be applied for 1 minute between live parts and the body frame. There shall not be any kind of breakdown, flashover or tripping of supply.

6.9 OVERVOLTAGE PROTECTION:-

The USB shall withstand 250V DC/AC for 2 minutes. There shall be no damage in any of the components.

6.10 SHORT CIRCUIT PROTECTION:-

The USB shall withstand short circuit protection. The USB shall work normal after fault clearance.

6.11 SURGE PROTECTION:-

It shall withstand a surge of 4kV ±5% as per procedure given in IEC-60571 at the input terminal of USB.

6.12 REVERSE POLARITY:-

The USB shall withstand polarity reversal. It shall be operated with reverse voltage for 5 minutes at maximum value of voltage range. At the end of this period the supply shall made in correct polarity and USB shall operate in a normal way.

6.13 TEMPERATURE RISE TEST:-

Temperature rise test shall be conducted at 90V DC with full load. The temperature shall be recorded by temperature detector mounted at the specified reference points on the body of semiconductor, capacitors and other components. The maximum recorded temperature under worst condition shall be corrected to 55°C and compared with maximum permissible temperature (for power devices at junction).

The temperature at junction shall not exceed 125°C when corrected to 55°C. The maximum temperature rise of the electronic devices on the PCB shall not be more than 20°C.

6.14 FIRE REATRDENT TEST:-

Fire retardant test shall be conducted as applicable for compliance to EN45545,HL-3 for the insulating material used in the USB.

6.15 IP PROTECTION TEST:-

This test shall be conducted as per IEC-60529.

6.16 VIBRATION & SHOCK TEST:-

The complete unit together with its mounting arrangement shall be subjected to the vibration & shock testing (for category-1 class-A) as per latest IEC-61373.

6.17 ENVIRONMENTAL TESTS:-

The USB shall meet the following tests as prescribed in IEC-60571

a) Dry heat test
b) Damp heat test
c) Test in corrosive atmosphere
d) Burn in test on PCB controller card as per RDSO specification no. ELRS/SPEC/SPEC/S1/0015 (Rev-1) Oct-2011 for 45 hrs.

6.18 EMI/EMC TEST:-

EMI/EMC test shall be conducted on USB unit as per IEC-61000-4-2, IEC-61000-4-3, IEC-61000-4-4 and IEC-61000-4-6.

6.19 ENDURANCE TEST:-

The unit shall be kept "ON" with input voltage of 110V DC for 200 hours. After this, the USB unit is subjected to 20,000 cycles of "ON" and "OFF", each cycle consisting of 3 seconds "ON" and 10 seconds "OFF" period. USB shall pass this test.

7.0 MARKING

The following information shall be marked on the housing of the USB.

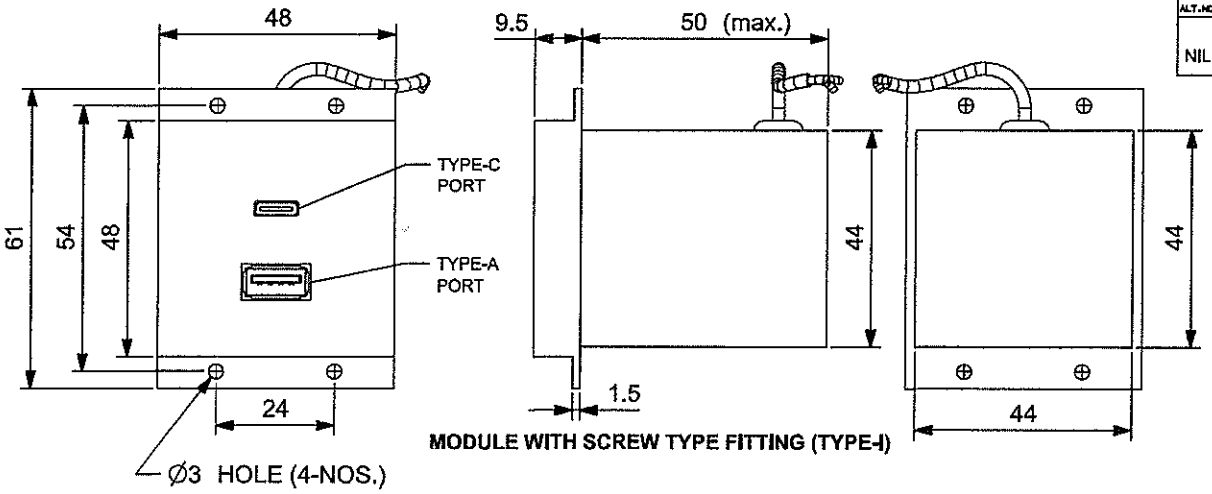
a) Indian Railway Insignia.
b) Year of manufacture/Serial number (MM/YY/ABCD)
c) Name of manufacturer
d) Rated voltage (input/Output)
e) USB type 'A' socket shall be marked with Simbel for proper insertion of plug to avoid accidental breakage

8.0 APPROVAL

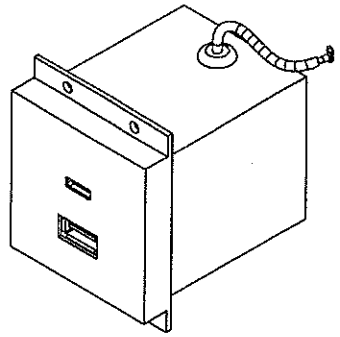
While seeking approval, the firm shall submit sample to the Approving Authority along with test results, circuit diagram and dimensional drawing of the USB charger. Firm Manufacturing for the first time shall take prototype approval from CEDE/RCF.

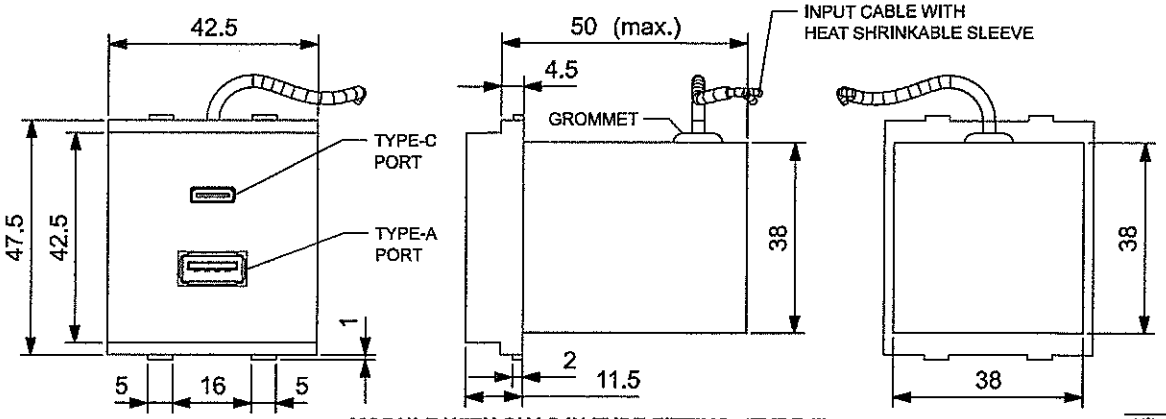
9.0 ENCLOSURES

Drg no SKED-959

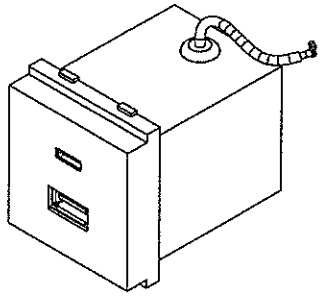


MODULE WITH SCREW TYPE FITTING (TYPE-I)





MODULE WITH SNAP IN TYPE FITTING (TYPE-II)



ALT.NO	ALT.DATE	ZONE	ALTERATIONS	AUTHORITY
NIL	NIL	NIL	NIL	NIL

NOTE:-

1. ALL DIMENSIONS IN MM.
2. THE MODULE WITH TYPE-A & C USB CHARGER SHALL CONFORM TO SPEC. NO. EDTS-455.
3. DIMENSIONS ARE SHOWN FOR REFERENCE ONLY. SUPPLIER SHALL GET PRIOR APPROVAL OF DRAWING BEFORE PROTOTYPE/BULK SUPPLIES. THE MODULE SHALL BE SUITABLE FOR FITTMENT IN EXISTING SWITCH PLATES PROVIDED IN LHB TYPE AC/NON-AC COACHES.

ITEM	DESCRIPTION & DIMENSIONS	QPASSLY	DETAIL DRG	MATL. & SPEC.	REMARKS
		NIL	NIL	NIL	NIL

GROUP: ELECTRICAL — SUPERSEDES:

FILE: D:\BKRM\SKED\sked-959.prt

MODULE FOR TYPE-A & C USB CHARGER

S.AREA NIL M²

SCALE | SSE/ED | CHD | DRN BKRM

RAIL COACH FACTORY, KAPURTHALA — REF.DRG.NO. NIL

रेलकोच फैक्टरी कपूरथला | IRS

PL NO. NIL

DRG.NO. SKED-959

ALT. NIL SIZE A3 SHEET 1/1

SEE/D&D | DY.CEE/DEP.

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FOR UNTOLERANCED DIMENSIONS REFER MDG0008 | DATE OF FIRST ISSUE 09/05/2024

Amendment 1 to specification for USB MOBILE CHARGING SOCKET

TYPE-A & TYPE-C (HIGH CAPACITY)

The rating of the USB charger Type A & C has been revised as 45 watts. The following clause may be read as

A) Clause 4.0,

Existing

i.	Mobile Charging Technology/Protocol	Power delivery (PD) & Programmable Power supply (PPS)
ii.	Input Voltage	110 V AC ± 5% Single phase (50 Hz ±3%) 110 V DC (30% Ripple)
iii.	Operating Voltage Range	90-140V AC/DC
iv.	Output Voltage & Current range	• Type-A 5VDC/2A (10 W Max) • Type-C (PD)= 5VDC, 3A (15W max)/ 9.0 V, 3 A (27 W Max)/ 12.0 V, 3A (PPS)=3.3-15.5 V, 2.25 A (7.5-35 W
v.	Wattage	35W ± 5 % for Dual port USB (Ty- A&C)
vi.	Driver Efficiency	>80%
vii.	Electrical protection	Open Loop, Short Circuit, Under Voltage, Overvoltage, Surge upto 4 KV, Thermal Overload

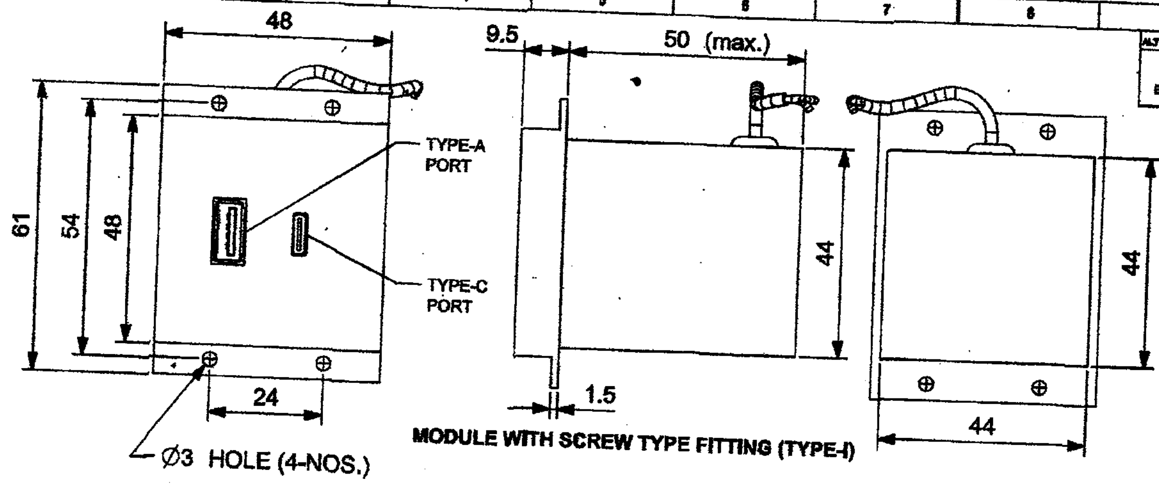
May be read as

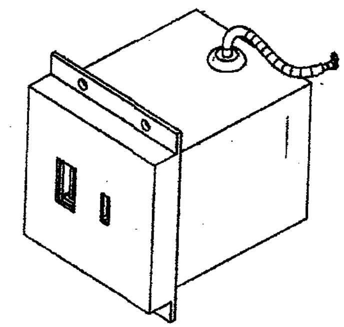
i.	Mobile Charging Technology/Protocol	Power delivery (PD) & Programmable Power supply (PPS)
ii.	Input Voltage	110 V AC ± 5% Single phase (50 Hz ±3%) 110 V DC (30% Ripple)
iii.	Operating Voltage Range	90-140V AC/DC
iv.	Output Voltage & Current range	• Type-A 5VDC/3A (15 W Max) • Type-C (PD)= 5VDC, 3A (15W max)/ 9.0 V, 3 A (27 W Max)/ 12.0 V, 3A (36W Max)/15.0 V, 2.25A(35 W Max)/20.0 V, 1.8 A (36W Max) (PPS)=3.3-15.5 V, 2.25 A (7.5-35 W)/ 21.0 V, 1.7 A (36 W)
v.	Input Wattage	45W ± 5 % for Dual port USB (Ty- A&C)
vi.	Driver Efficiency	>80%
vii.	Electrical protection	Open Loop, Short Circuit, Under Voltage, Overvoltage, Surge upto 4 KV, Thermal Overload

B) Following clause may be read as

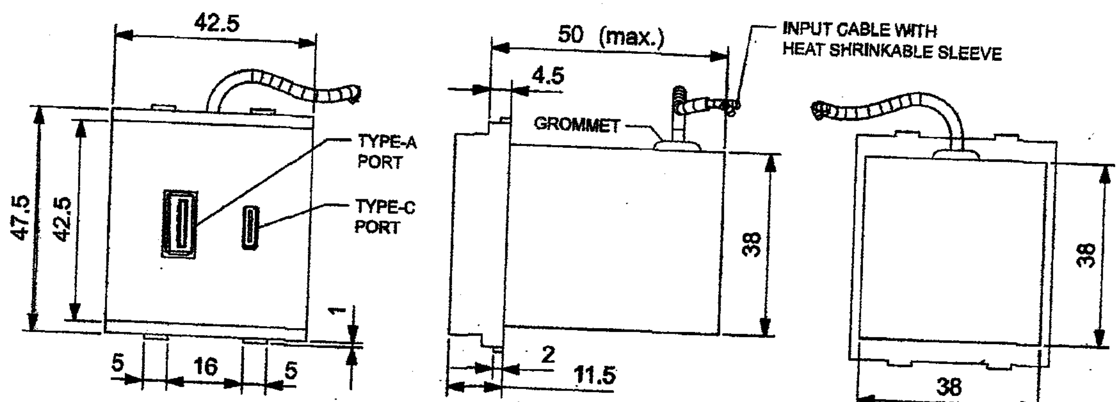
Clause	Existing	Revised
5.15	The Overall size of the USB mobile charging socket housing shall be as per RCF SKED 959 for both Type-I (Screwed type) & Type – II (snap Fit Type). The USB charging module shall be suitable for fitment into two module switch plate assembly for provision in place of/replacement of existing 3/5 pin mobile charging socket	The Overall size of the USB mobile charging socket housing shall be as per RCF **SKED 959 alt- 'a'** for both Type-I (Screwed type) & Type – II (snap Fit Type). The USB charging module shall be suitable for fitment into two module switch plate assembly for provision in place of/replacement of existing 3/5 pin mobile charging socket
5.16.4	The Cable Entry on the USB module shall be on the side of the module and towards switch for ease of connections.	The Cable Entry on the USB module shall be on the top of the module
9	ENCLOSURES Drg no SKED-959	ENCLOSURES Drg no SKED-959 alt-'a'

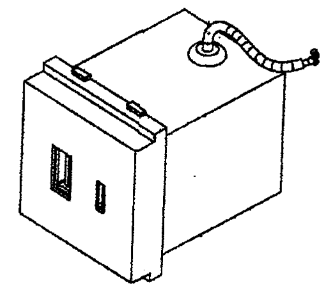
ALT. NO.	ALT. DATE	ZONE	ALTERATIONS	AUTHORITY
a	15.06.2024	ALL	1. ORIENTATION OF TYPE-A & C PORT CHANGED.	C.R.NO. 2300240007





MODULE WITH SCREW TYPE FITTING (TYPE-I)





MODULE WITH SNAP IN TYPE FITTING (TYPE-II)

NOTE:-

1. ALL DIMENSIONS IN MM.
2. THE MODULE WITH TYPE-A & C USB CHARGER SHALL CONFORM TO SPEC. NO. EDTS-455.
3. DIMENSIONS ARE SHOWN FOR REFERENCE ONLY. SUPPLIER SHALL GET PRIOR APPROVAL OF DRAWING BEFORE PROTOTYPE/BULK SUPPLIES. THE MODULE SHALL BE SUITABLE FOR FITTMENT IN EXISTING SWITCH PLATES PROVIDED IN LHB TYPE AC/NON-AC COACHES.

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ITEM	DESCRIPTION & DIMENSIONS	QPASSLY	DETAIL DRG	MATL. & SPEC.	REMARKS
NIL		NIL	NIL	NIL	NIL

GROUP: ELECTRICAL
SUPERSEDES:
FILE: D:\BKRM\SKED\sked-959a.prt

NIL
NIL
S.AREA NIL M²
NIL
NIL
NIL

MODULE FOR TYPE-A & C USB CHARGER

RAIL COACH FACTORY, KAPURTHALA
रेलकोच फैक्टरीकपूरथला
IRS

SCALE | SSE/ED | CHD | DRN
REF.DRG.NO. NIL
PL NO. NIL
DRG.NO. SKED-959
ALT. a | SIZE A3 | SHEET 1/1

SSE/D&D | DY.CEE/DP

This Corrigendum is issued to EDTS-455, Rev-Nil, Amnd.-1 to modify the electrical parameters and incorporate the Male/Female cage camp connector in drawing of TYPE-A&C USB module:

Following clause has been changed:

Clause 9.0: ENCLOSURES

Existing 959 Blm Les
Drg. No. SKED-~~455~~, Alt-a
May be read as. 959 Blm Les
Drg. No. SKED-~~455~~, Alt-b

Clause 4.0: ELECTRICAL PARAMETERS:

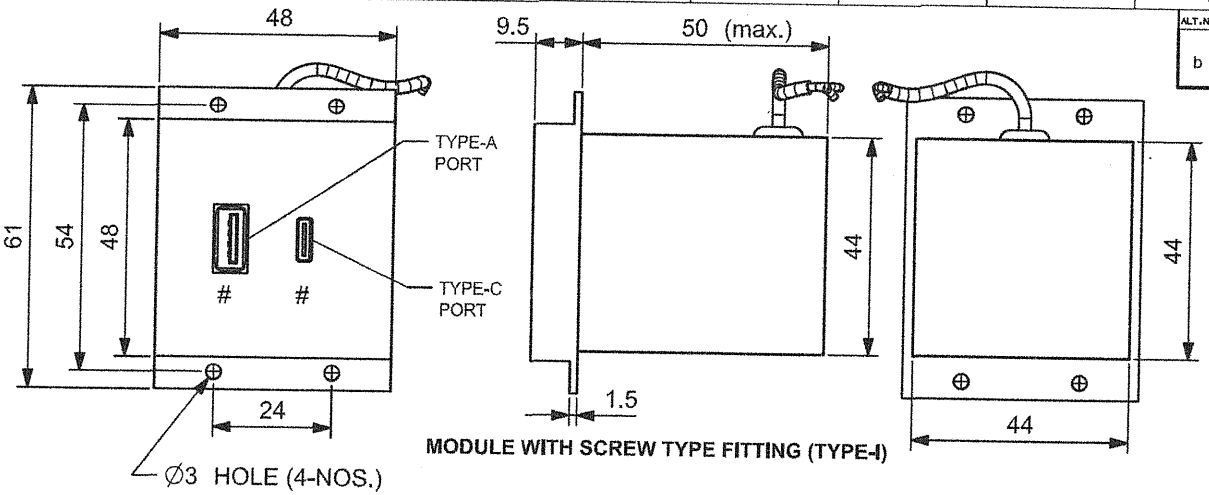
Existing

i.	Mobile Charging Technology/Protocol	Power delivery (PD) & Programmable Power supply (PPS)
ii.	Input Voltage	110V AC ±5% Single phase (50Hz ±3%) 110V DC (30% Ripple)
iii.	Operating Voltage Range	90-140V AC/DC
iv.	Output Voltage & Current range	• Type-A 5V DC/3A (15W) • Type-C (PD)= 5V DC, 3A (15W max)/ 9.0V, 3A (27W Max)/ 12.0V, 3A (36W Max)/15.0V, 2.25A(35W Max)/20.0V, 1.8A (36W Max) PPS= 3.3-15.5V, 2.25A (7.5-35W)/ 21.0V, 1.7A (36W)
v.	Input Wattage	45W ±5% for Dual port USB (Ty- A&C)
vi.	Driver Efficiency	>80%
vii.	Electrical protection	Open Loop, Short Circuit, Under Voltage, Overvoltage, Surge upto 4KV, thermal Overload

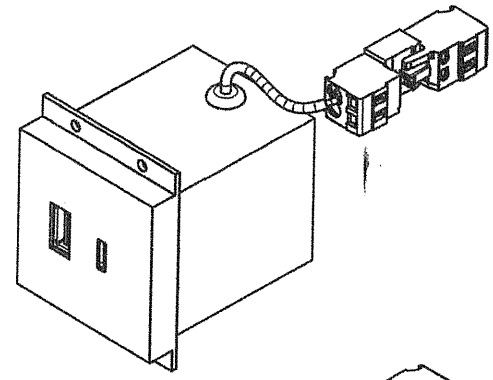
May be read as

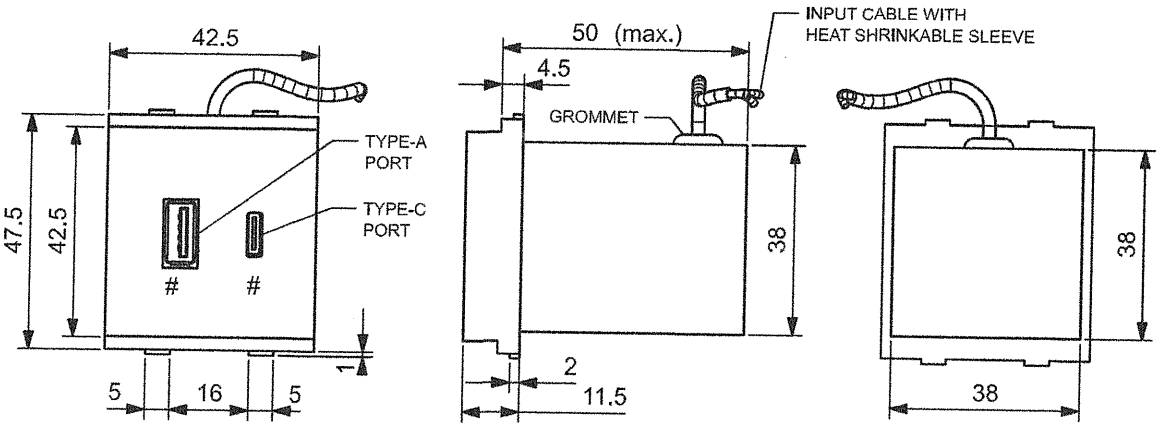
i.	Mobile Charging Technology/Protocol	Power delivery (PD3.0) & Programmable Power supply (PPS) Quick Charge (QC3.0)
ii.	Input Voltage	110V AC ±5% Single phase (50Hz ±3%) 110V DC (30% Ripple)
iii.	Operating Voltage Range	90-140V AC/DC
iv.	Output Voltage & Current range	• Type-A(QC3.0)=5V DC/3A (15W), 9V DC/ 3A (27W), 12V DC/3A (36W) • Type-C(PD3.0)= 5V DC/3A (15W max), 9.0V/3A (27W Max), 12.0V/3A (36W Max), 15.0V/2.25A (35W Max), 20.0V/1.8A (36W Max) (PPS)= 3.3-15.5V/2.25A (7.5-35W), 21.0V/1.7A (36W) Note: Ripple factor less than 10%
v.	Input Wattage	45W ±5% for Dual port USB (Ty- A&C)
vi.	Driver Efficiency	>80%
vii.	Electrical protection	Open Loop, Short Circuit, Under Voltage, Overvoltage, Surge upto 4KV, thermal Overload

ALT.NO	ALT.DATE	ZONE	ALTERATIONS	AUTHORITY
b	26.07.2024	ALL	1. NOTE-4, 5 & 6 ADDED.	C.R.NO. 2300240012



MODULE WITH SCREW TYPE FITTING (TYPE-I)





MODULE WITH SNAP IN TYPE FITTING (TYPE-II)

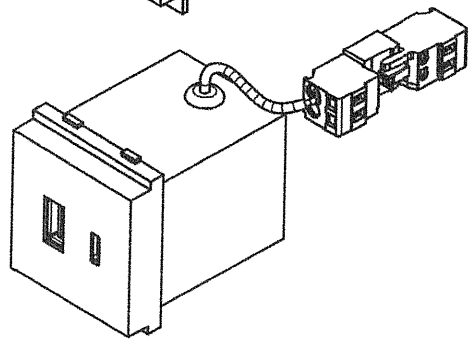


TABLE-1

DESCRIPTION	CAT. NO. & MAKE	QTY.
Male connector with cage clamp	721-602 of M/s WAGO/PHOENIX or Equivalent approved make	1
Female connector with cage clamp	721-102/026-000 of M/s WAGO/PHOENIX or Equivalent approved make	1

6. WATTAGE ALONGWITH PD/PPS & QC TO BE MENTIONED BELOW EACH PORT.
5. EXTERNAL LENGTH OF CABLE FROM USB MODULE TO TERMINAL CONNTCTOR SHALL BE 200MM(MINIMUM).
4. TERMINAL CONNECTOR SHALL BE PROVDED AT THE END OF CABLE AS PER TABLE-1
3. DIMENSIONS ARE SHOWN FOR REFERENCE ONLY. SUPPLIER SHALL GET PRIOR APPROVAL OF DRAWING BEFORE PROTOTYPE/BULK SUPPLIES. THE MODULE SHALL BE SUITABLE FOR FITTMENT IN EXISTING SWITCH PLATES PROVIDED IN LHB TYPE AC/NON-AC COACHES.
2. THE MODULE WITH TYPE-A & C USB CHARGER SHALL CONFORM TO SPEC. NO. EDTS-455.
1. ALL DIMENSIONS IN MM.

NOTE:-

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FOR UNTOLERANCED DIMENSIONS REFER MDG0008 | DATE OF FIRST ISSUE 09/05/2024

NIL | NIL | NIL | NIL | NIL | NIL

ITEM	DESCRIPTION & DIMENSIONS	QPASSLT	DETAIL DRG	MATL. & SPEC.	REMARKS
GROUP	ELECTRICAL	SUPERSEDES:			
FILE	D:\BKRM\SKED\sked-959a.prt				

S.AREA NIL M²

MODULE FOR TYPE-A & C USB CHARGER

RAIL COACH FACTORY, KAPURTHALA

रेलकोच फैक्टरी कपूरथला IRS

SEE/D&D DY.CEE/DP

SCALE | SSE/ED | CHD | DRN

REF.DRG.NO NIL

PL NO. NIL

DRG.NO. SKED-959

ALT. b SIZE A3 SHEET 1/1