Technical Datasheet

emnify

emnify Advanced eSIM

SGP.32/IoT eSIM

Based on specifications from IDEMIA

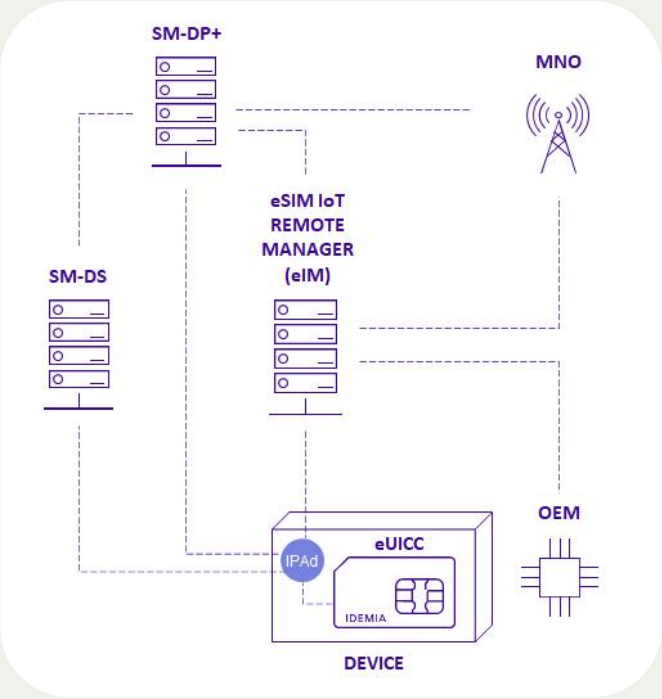
Overview

The emnify Advanced eSIM is an eUICC that allows IoT solution providers and OEMs to download operator profiles over the Air remotely from a single platform. The emnify Advanced eSIM fully supports the SGP.32 specification and remote management functionality is exposed via the emnify platform and API.

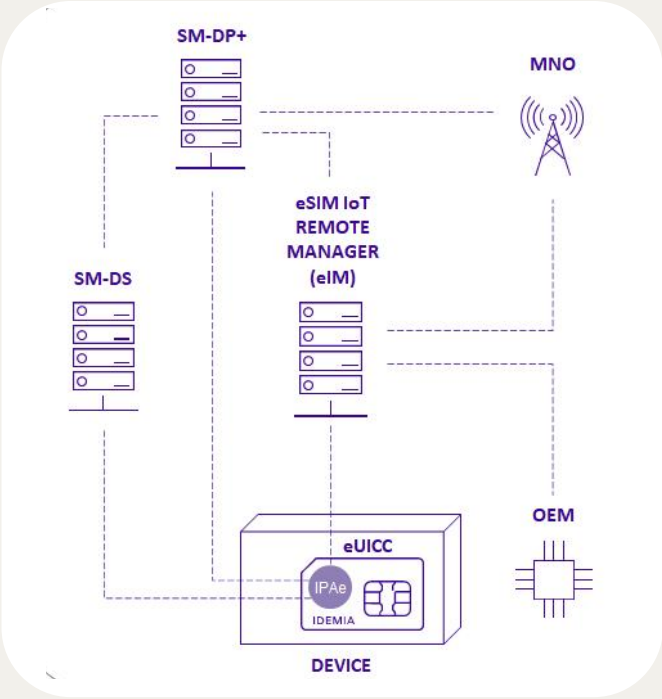
The solution includes:

- the Advanced eSIM
- the emnify SMDP+ that stores emnify
- eSIM profiles
- the eIM that allows to manage the profile updates from emnify or 3rd party SMDP+

The Advanced eSIM supports both deployment options - with the IoT profile assistant (IPA) on the device (IPAd) and on the eUICC (IPAe).



Architecture with IPA on the device (IPAd)



Architecture with IPA on the eUICC (IPAe)

Platform features

Software Features

GSMA SGP.32 v1.2 certified:

- Profile operations (enable, disable, delete, audit)
- Immediate enable mechanism
- Emergency profile support
- Fallback / Rollback mechanisms
- Direct Profile Download
- Indirect Profile Download with CoAP/DTLS
- 5G SA with BER-TLV support

IPA:

IPAe

- Built-in IPAe
- Remotely configurable

IPAd

- IPAd interface support

Value Added services:

- Location change mechanism
- Push SMS polling trigger
- Remotely configurable connectivity parameters
- OS Update

USIM, ISIM support:

NAA algorithms

- Milenage
- TUAK

Subscriber privacy for 5G

- SUPI protection profiles: null, A & B

Hardware Features

up to 180kB for MNO profiles and OEM data

Cortus APS3CD 32 bit core – 30 Mips in 55nm
30 kB RAM (including 2KB of Crypto RAM)
AES 128/192/256
ECC up to 521 bits
True Random Generator

Enhanced Memory Endurance:

- 2M cycles on 30 sectors
- 500K cycles on other sectors

Data retention

- 15 years

Form factors

- Pluggable
- MFF2
- MFF4

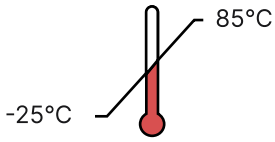
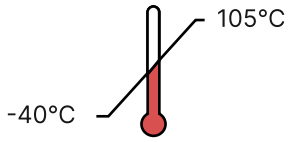
Voltage Class: A, B and C (1.62V to 5.5V)
Interfaces: ISO

ESD protection:

- 6KV (HBM) for ISO
- 4KV (HBM) for I2C
- 1KV (CDM)

IC EAL5+ certification
ROHS & REACH compliance

Hardware variants

	Commercial	Industrial
Operating	-25°C 85°C 	-40°C 105°C 
Form Factors	pluggable & MFF2 	pluggable, MFF2 & MFF4 
Package Qualification ETSI TS 102 671	TB-MA-HA-CC-VA-SA-RC-UC	TB-MA-HA-CC-VA-SA-RC-UC
Data retention	15 years @85°	15 years @85°

Standard compliance

3GPP

3GPP TS 21.111 (v17.0.0, Rel-17): USIM and IC card requirements
3GPP TS 22.038 (v8.0.1 Rel-8): USIM Application Toolkit (USAT) - Stage 1
3GPP TS 23.040 (v17.1.0, Rel-17): Technical realization of the Short Message Service (SMS)
3GPP TS 23.041 (v12.8.0, Rel-12): Technical realization of Cell Broadcast Service (CBS)
3GPP TS 23.048 (v5.9.0, Rel-5): Security Mechanisms for the (U)SIM application toolkit; Stage 2
3GPP TS 31.048 (v5.1.0, Rel-5): Security mechanisms for the (U)SIM application toolkit; Test specification
3GPP TS 31.101 (v17.0.0, Rel-17): UICC-Terminal interface; Physical and Logical Characteristics
3GPP TS 31.102 (v17.8.0, Rel-17) Characteristics of the USIM Application
3GPP TS 31.103 (v17.0.0, Rel-17): Characteristics of the ISIM Application
3GPP TS 31.111 (v17.3.0, Rel-17): USIM Application Toolkit (USAT)
3GPP TS 31.115 (v17.0.0, Rel-17): Secured packet structure for (U)SIM Toolkit applications
3GPP TS 31.116 (v17.0.0, Rel-17): Remote APDU Structure for (U)SIM Toolkit applications
3GPP TS 31.122 (v17.1.0, Rel-17): USIM conformance test (card side)
3GPP TS 31.130 (v17.3.0, Rel-17): (U)SIM Application Programming Interface; (U)SIM API for Java™ Card
3GPP TR 31.900 (v17.0.0, Rel-17): SIM/USIM Internal and External Inter-working Aspects
3GPP TR 31.919 (v8.0.0, Rel-8): 2G/3G Java Card™ API based applet interworking
3GPP TS 33.102 (v17.0.0, Rel-17): 3G Security; Security architecture
3GPP TS 33.105 (v17.0.0, Rel-17): Cryptographic algorithm requirements
3GPP TS 33.501 (v17.8.0, Rel-17): Security architecture and procedures for 5G System
3GPP TS 35.205 (v17.0.0, Rel-17): Specification of the MILENAGE Algorithm Set
3GPP TS 42.017 (v4.0.0, Rel-4): SIM functional characteristics
3GPP TS 42.019 (v5.1.0, Rel-5): SIM API for Java Card™ - Stage 1
3GPP TS 43.019 (v6.0.0, Rel-6): Subscriber Identity Module Application Programming Interface;
3GPP TS 51.011 (v4.15.0, Rel-4): Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface
3GPP TS 51.014 (v4.5.0, Rel-4): Specification of the SIM Application Toolkit for the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface
3GPP TS 51.017 (v4.2.0, Rel-4): Test of SIM-ME interface (card side)

Java Card specifications

Java Card 3.1.0 API Specification
Java Card 3.1.0 Runtime Environment Specification
Java Card 3.1.0 VM Architecture Specification

Standard compliance

ETSI specifications

ETSI TS 101 220 (v12.0.0, Rel-12): Application Identifiers for telecommunications
ETSI TS 102 127 (v15.0.0, Rel-15): Transport Protocol for CAT Applications - Stage 2
ETSI TS 102 151 (v6.0.0, Rel-6): Measurement of Electromagnetic Emission of SIM cards
ETSI TS 102 221 (v17.2.0, Rel-17): UICC-Terminal interface; Physical and logical characteristics
ETSI TS 102 222 (v17.1.0, Rel-17): Administrative Commands for telecommunications applications
ETSI TS 102 223 (v17.0.0, Rel-17): Card Application Toolkit
ETSI TS 102 224 (v15.0.0, Rel-15): CAT security – Stage 1
ETSI TS 102 225 (v18.1.0, Rel-18): Secured packet structure for UICC applications
ETSI TS 102 226 (v18.0.0, Rel-18): Remote APDU Structure for UICC based Applications

Global Platform specifications

Global Platform Card Specification 2.3
Global Platform UICC Configuration version 2.0
Global Platform Card – Amendment B version 1.2

GSMA specifications

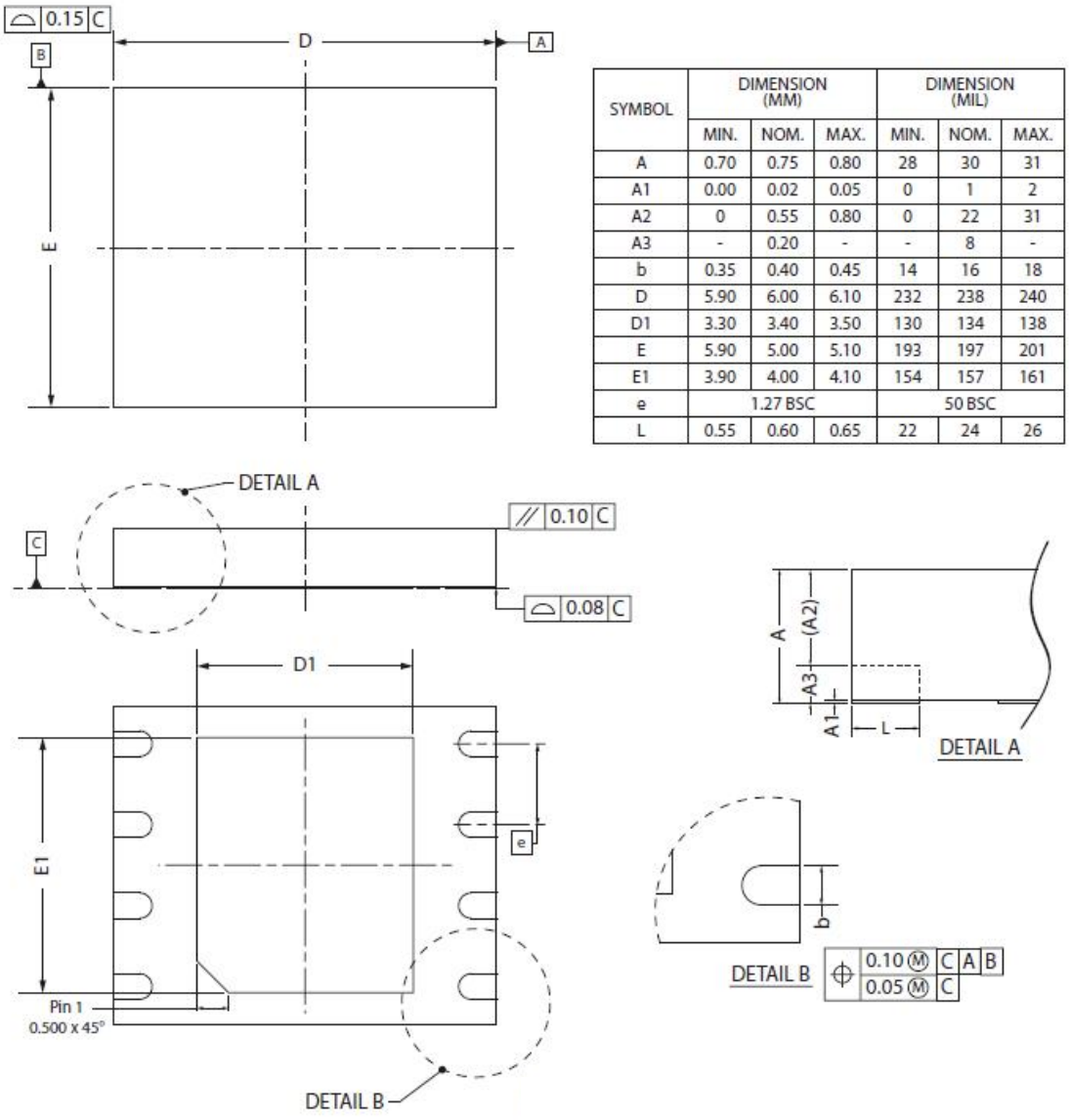
GSMA SGP.31 – eSIM IoT Architecture and Requirement Specification 1.2
GSMA SGP.32 – eSIM IoT Technical Specification 1.2
GSMA SGP.33-1 – eSIM IoT Test Specification for the eUICC 1.2

TCA (SIMAlliance)

Interoperable Format Technical Specification v3.3.1

SMD Packages – MFF2

ETSI TS 102 671 defines the mechanical specifications of the M2M Form Factor #2 (MFF2).



SYMBOL	DIMENSION (MM)			DIMENSION (MIL)		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	28	30	31
A1	0.00	0.02	0.05	0	1	2
A2	0	0.55	0.80	0	22	31
A3	-	0.20	-	-	8	-
b	0.35	0.40	0.45	14	16	18
D	5.90	6.00	6.10	232	238	240
D1	3.30	3.40	3.50	130	134	138
E	5.90	5.00	5.10	193	197	201
E1	3.90	4.00	4.10	154	157	161
e	1.27 BSC			50 BSC		
L	0.55	0.60	0.65	22	24	26

NOTE:
1. Refer to JEDEC Std: MO-229.
2. Dimension "b" applies to metallized terminal and is measured between 0.15 mm and 0.30 mm from the terminal tip.
If the terminal has optional radius on the other end of the terminal, the dimension should not be measured in that radius area.

SMD Packages – MFF2

Package pinout

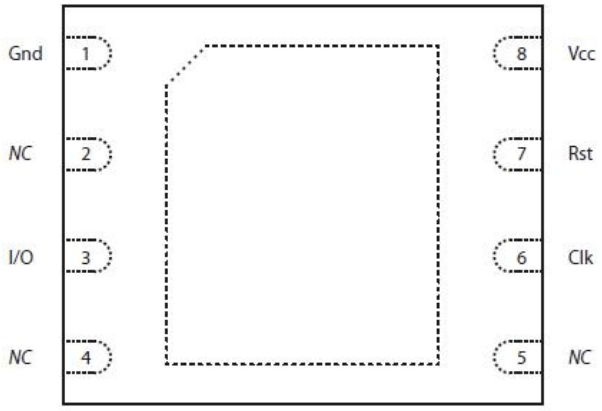


Fig. 1 – MFF2 pinout top view

e-pad underneath the package is not connected

Marking

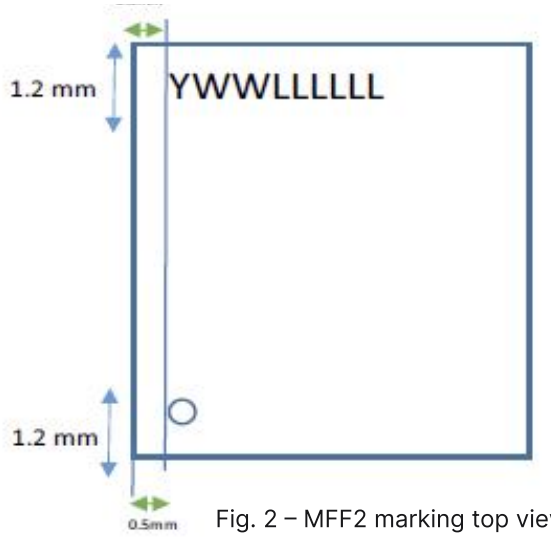


Fig. 2 – MFF2 marking top view
(dot indicates pin 1 position)

Where:

Y: Last digit of year of assembly
WW: Week of assembly
LLLLLL is the wafer lot number
(6 last digits of wafer lot number).

SMD Packages – MFF2

Tape and Reel information

Surface-mount packages are supplied with Tape and Reel packing.

The tape-and-reel configuration is used for transport and storage from the supplier of the electronic components to the customer, and for use in the customer manufacturing plant.

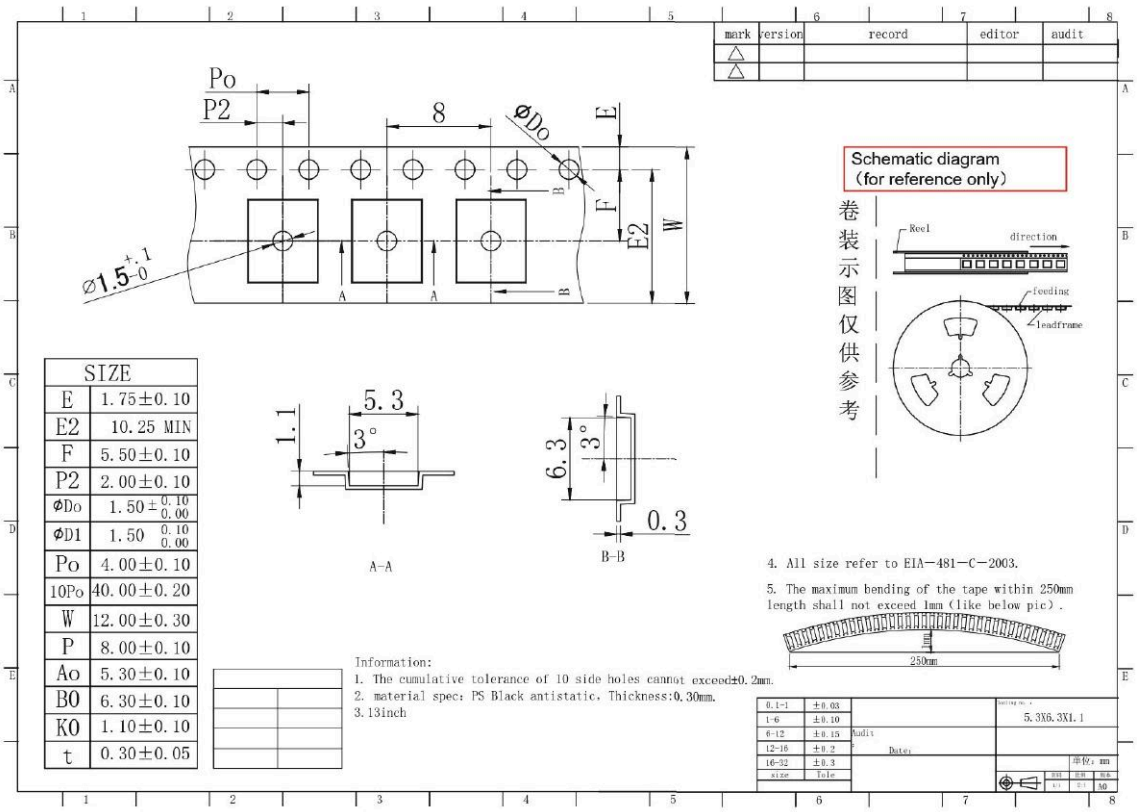


Fig. 4 – MFF2 tape & reel information

Reel dimensions are defined by the following standards: EIA-481-1, EIA-481-2, and EIA-481-3.

Reels that contain the sealed carrier tape are polystyrene (PS). Reels can have one, two, or three parts. Typically, the reels are a black colour, but other colours are acceptable. The reels are recyclable.

emnify delivers 330 mm (13”) and 180 mm (7”) reels which can support respectively up to 5,000 units and 1,000 units per reel.

SMD Packages – MFF4

ETSI TS 102 671 defines the mechanical specifications of the M2M Form Factor #4 (MFF4).

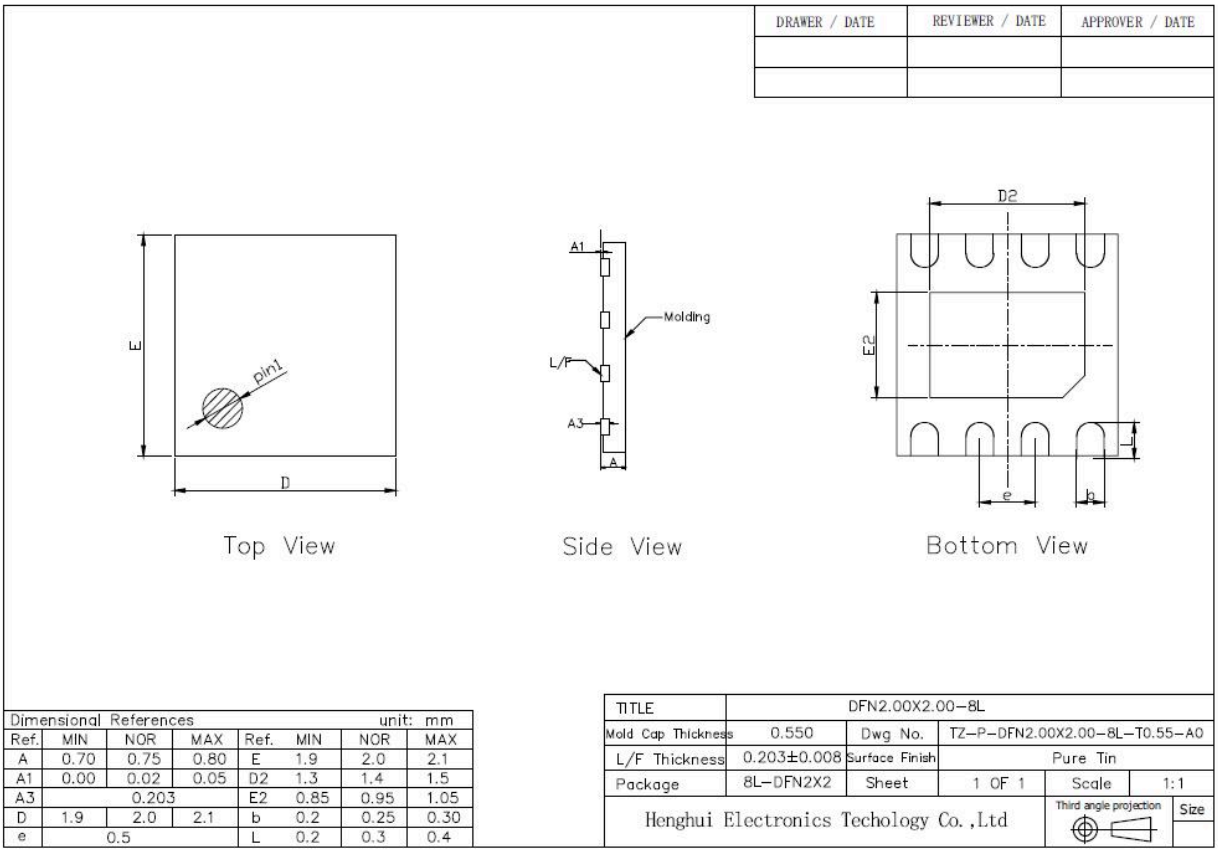


Fig. 8 – MFF4 Drawing

SMD Packages – MFF4

Package pinout

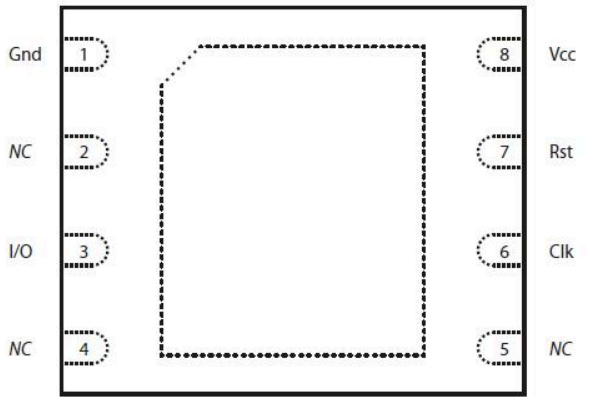


Fig. 5 – MFF4 IOS Pinout Top view

1. ISO Pinout

e-pad underneath the package is not connected

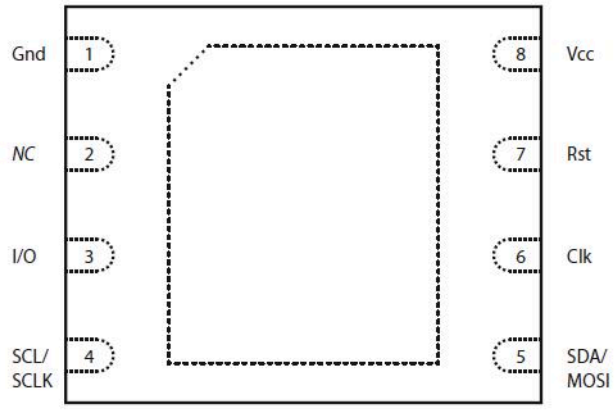


Fig. 6 – MFF4 I2C Pinout Top view

2. I2C Pinout

e-pad underneath the package is not connected

Marking

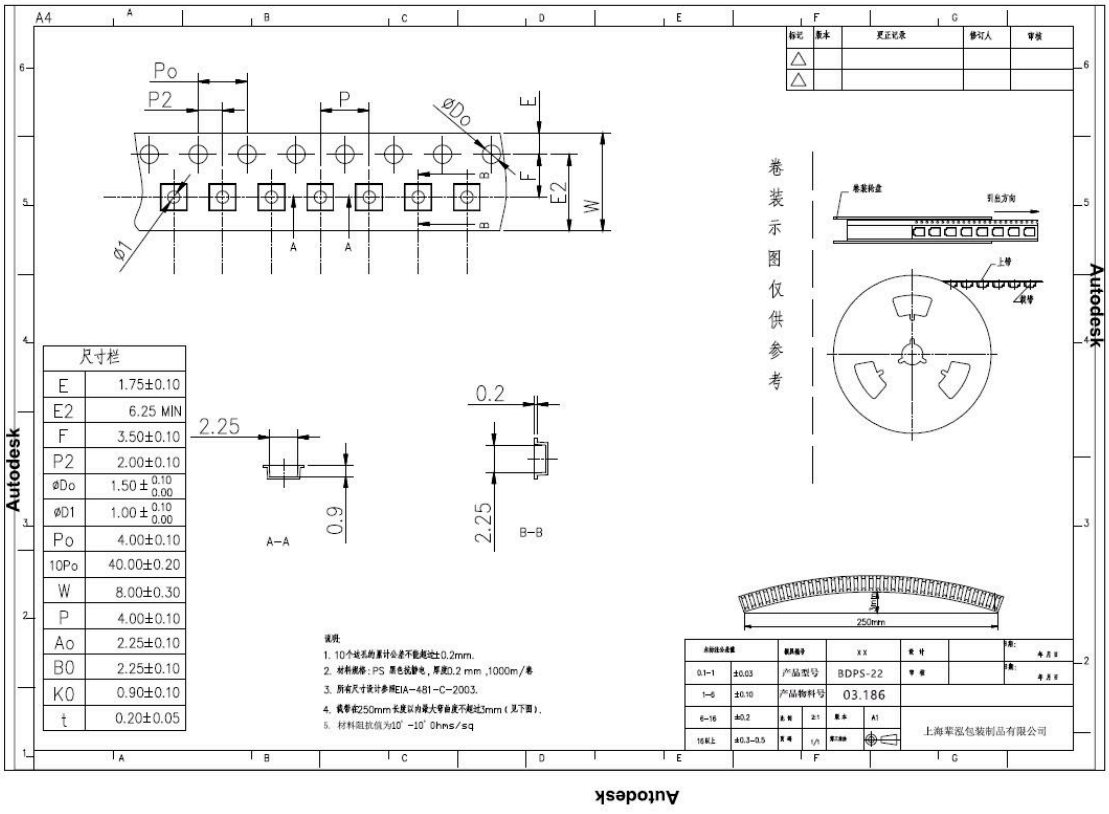
This package does not have marking.

SMD Packages – MFF4

Tape and Reel information

Surface-mount packages are supplied with Tape and Reel packing.

The tape-and-reel configuration is used for transport and storage from the supplier of the electronic components to the customer, and for use in the customer manufacturing plant.



尺寸栏	
E	1.75±0.10
E2	6.25 MIN
F	3.50±0.10
P2	2.00±0.10
øDo	1.50 ± 0.10/0.00
øD1	1.00 ± 0.10/0.00
Po	4.00±0.10
10Po	40.00±0.20
W	8.00±0.30
P	4.00±0.10
Ao	2.25±0.10
B0	2.25±0.10
K0	0.90±0.10
t	0.20±0.05

Fig. 9 – MFF4 tape & reel information

Reel dimensions are defined by following standards: EIA-481-1, EIA-481-2, and EIA-481-3 standards

Reels that contain the sealed carrier tape are polystyrene (PS). Reels can have one, two, or three parts. Typically, it is black, but other colors are acceptable. The reels are recyclable.

emnify delivers 330 mm (13”) and 180 mm (7”) reels which can support respectively up to 10,000 units and 3,000 units per reel.