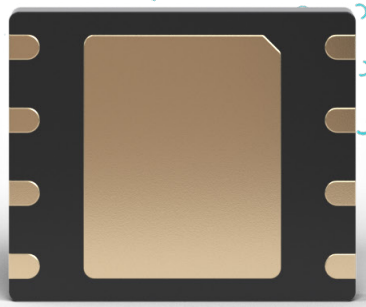
SORACOM

Global IoT Multi-Carrier

eSIM



IoT Connectivity and Platform Services

Soracom provides IoT connectivity and platform services to over 20,000 businesses and over 5M connections, with solutions for every challenge in IoT. We're focused on making it easy to connect M2M devices at scale, with a powerful IoT SIM that provides connectivity in 160 countries. Soracom provides direct integrations with the world's leading cloud platforms, making it easy to transmit data from your device to AWS, Google Cloud Platform, or Microsoft Azure.

Our team of IoT experts is on hand to learn more about your challenges, and to discuss how Soracom can help at every stage of your product development lifecycle.

No Lock In's

Flexible Plans

Cloud Agnostic

Total Visibility

You create. We connect.

Soracom eSIMs are designed for mass-production, and help tech innovators connect devices to the cloud over cellular at scale.

Built to withstand temperatures ranging from -40°C to +105°C – and with data retention of up to 15 years – Soracom eSIMs ensure that devices stay connected in even the most extreme environments.

Features

- Cellular data plans for 2G, 3G, 4G LTE and Cat-M1 with coverage in 160 countries
- Pay-as-you-go pricing – only ever pay only for the data you use
- A secure IoT connection
- Direct integration with AWS, Azure, and Google Cloud
- Easy network control and management with the Soracom Console and API

Questions? Visit **soracaom.io** for more information.

IoT eSIM Technical Specifications

Software Specifications
Java Card 3.0.2
3GPP Release 11
OTA over SMS (SCP80)
OTA over HTTPs: Global Platform 2.2 amendment B (SCP81)
Java Card Cryptographic APIs ● CRC16, CRC32 ● DES, 3DES ● AES 128/256 bits
Soracom Subscription container applet
Soracom Local information applet

Hardware Specifications	
Supply voltage	1.62V to 3.3V (Class B/C)
Operating Temperature	-25°C to +85°C
Data retention	Up to 15 years at 85°C 10 years at 105°C
NVM Endurance	Up to 500,000 Cycles/page @ 105°C
ESD Protection	>4kv
Ruggedized Form Factor MFF2	TB-MA-HA-CA-VA-SA-RA-UB
Compliance	RoHS compliant

IoT eSIM Orderable Quantity

Soracom Part Number	Short Description	Number of devices per reel
SGEIL01-01-1000	**Global multi-carrier eSIM iIndustrial-grade MFF2	1,000
SGEIL01-01-3000		3,000
SGECL01-01-1000	**Global multi-carrier eSIM Commercial-grade MFF2	1,000
SGECL01-01-3000		3,000

** SGECL01 and SGEIL01 eSIMs are not eUICC compatible, they use Subscription Containers to manage multiple IMSI profiles (see below). However, Soracom also has eUICCenabled eSIMs. Contact us directly for more information.

Leveraging Subscription Containers (Multi IMSI)

All of the advantages of eUICC without any of its major drawbacks

When soldering an eSIM into a device, you want to know that you're future proofed and can avoid situations where you're forced to make device updates in the field.

Subscription Containers is how Soracom implements a sophisticated approach to Multi IMSI eSIMs. Manage subscriptions for deployed eSIM enabled devices with OTA updates and automatically prioritize network usage that maximizes extra coverage and lower cost. This allows the same eSIM to reach new markets or access lower rates without any extra work.

Questions? Visit **soracaom.io** for more information.

SORACOM

SORACOM embedded SIM Commercial grade (plan01s), SGECL01

Software Features	• Java Card™ 3.0.2
	• 3GPP Release 12
	• Telecom Applications
	  ○ USIM
	  ○ SIM
	• OTA
	  ○ OTA over SMS (SCP80)
	  ○ OTA over HTTPs: Global Platform 2.2 amendment B (SCP81)
	• Java Card™ Cryptographic APIs
	  ○ CRC32
	  ○ DES, 3DES
	  ○ AES 128 bits, 256 bits
	• SIM applets
	  ○ SORACOM Subscription Container applet
	  ○ SORACOM Local Information applet
	• Low Power
	  ○ Suspend UICC during eDRX/PSM: enabled

Hardware Features	• Supply voltage 1.62V to 5.5V (Class A/B/C) • Temperature Range: Operating -25°C to +85°C • Data Retention: Up to 10 years at 85°C • NVM Endurance: Up to 100,000 Cycles/page @ 85°C • ESD Protection > 4kv • Ruggedized Form Factor MFF2 (ETSI TS 102 671 compliancy): TS-MA-HA-CA-VA-SA-RA-UB • ROHS compliance • Country of manufacture: China

SORACOM embedded SIM Industrial grade

Software Features	• Java Card™ 3.0.2
	• 3GPP Release 11
	• Telecom Applications
	  ○ USIM
	  ○ SIM
	• OTA
	  ○ OTA over SMS (SCP80)
	  ○ OTA over HTTPs: Global Platform 2.2 amendment B (SCP81)
	• Java Card™ Cryptographic APIs
	  ○ CRC16, CRC32
	  ○ DES, 3DES
	  ○ AES 128 bits, 256 bits
	• SIM applets
	  ○ SORACOM Subscription Container applet
	  ○ SORACOM Local Information applet
	• Low Power
	  ○ Suspend UICC during eDRX/PSM: enabled

Hardware Features	• Supply voltage 1.62V to 5.5V (Class A/B/C) • Temperature Range: Operating -40°C to +105°C • Data Retention: 10 years at 105°C • NVM Endurance: Up to 500,000 Cycles/page @ 105°C • ESD Protection > 4kv • Ruggedized Form Factor MFF2 (ETSI TS 102 671 compliancy): TB-MA-HA-CA-VA-SA-RA-UB • ROHS compliance • Country of manufacture: China

SORACOM embedded SIM Industrial grade

Software Features	• Java Card™ 3.0.2
	• 3GPP Release 11
	• Telecom Applications
	  ○ USIM
	  ○ SIM
	• OTA
	  ○ OTA over SMS (SCP80)
	  ○ OTA over HTTPs: Global Platform 2.2 amendment B (SCP81)
	• Java Card™ Cryptographic APIs
	  ○ CRC16, CRC32
	  ○ DES, 3DES
	  ○ AES 128 bits, 256 bits
	• SIM applets
	  ○ SORACOM Subscription Container applet
	  ○ SORACOM Local Information applet
	• Low Power
	  ○ Suspend UICC during eDRX/PSM: enabled

Hardware Features	• Supply voltage 1.62V to 5.5V (Class A/B/C) • Temperature Range • Operating -40°C to +105°C • Data Retention: 10 years at 85°C, Up to 10 years at 105°C • NVM Endurance: Minimum 500,000 Cycles/page @ 85°C • ESD Protection > 4kv • Ruggedized Form Factor MFF2 (ETSI TS 102 671 compliancy): TB-MA-HA-CA-VA-SA-RA-UB • ROHS compliance • Country of manufacture: China

SORACOM embedded SIM Industrial grade

Software Features	• Java Card™ 3.0.4 CE
	• Telecom applications
	  ○ USIM
	  ○ SIM
	• OTA
	  ○ OTA over SMS (SCP80)
	  ○ OTA over HTTPs: Global Platform 2.2 amendment B (SCP81)
	• Global Platform 2.2.1
	  ○ Amendment A: Controlling Authority Scenario 2b
	  ○ Amendment C: Dynamic Memory Allocation
	  ○ Amendment D: SCP03 support
	  ○ Amendment E/F: Scenario 3
	• Java Card™ Cryptographic APIs
	  ○ CRC16, CRC32
	  ○ DES, 3DES, AES 128/256 bits
	  ○ RSA up to 2048 bits
	  ○ SHA-1, SHA-2, SHA-3
	  ○ ECC 128/256
	• Memory per profile Dynamic Memory Allocation
	• Up to 400kB Memory Space
	• SIM applets
	  ○ SORACOM Subscription Container applet
	  ○ SORACOM Local Information applet
	• Low Power
	  ○ Suspend UICC during eDRX/PSM: enabled

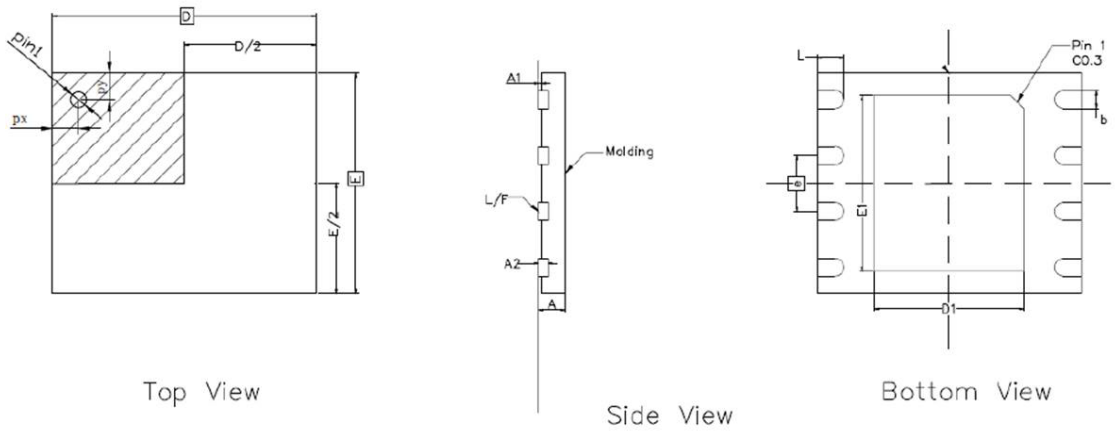
Hardware Features	• Supply voltage 1.62V to 5.5V (Class A/B/C)
	• Temperature Range
	  ○ Operating -40°C to +105°C/ Storage -40°C to +125°C
	• Data Retention Up to 15 years at 85°C
	• NVM Endurance
	  ○ Up to 500,000 Cycles/page @ 105°C
	• Max. Cycling: 16 million per 8
	• ESD Protection > 4kv
	• Common Criteria EAL5+
	• Ruggedized Form Factor MFF2 (ETSI TS 102 671 compliancy): TB-MA-HA-CA-VA-SA-RA-UB
	• ROHS compliance
	• Country of manufacture: China

MFF2 Packaging Datasheet

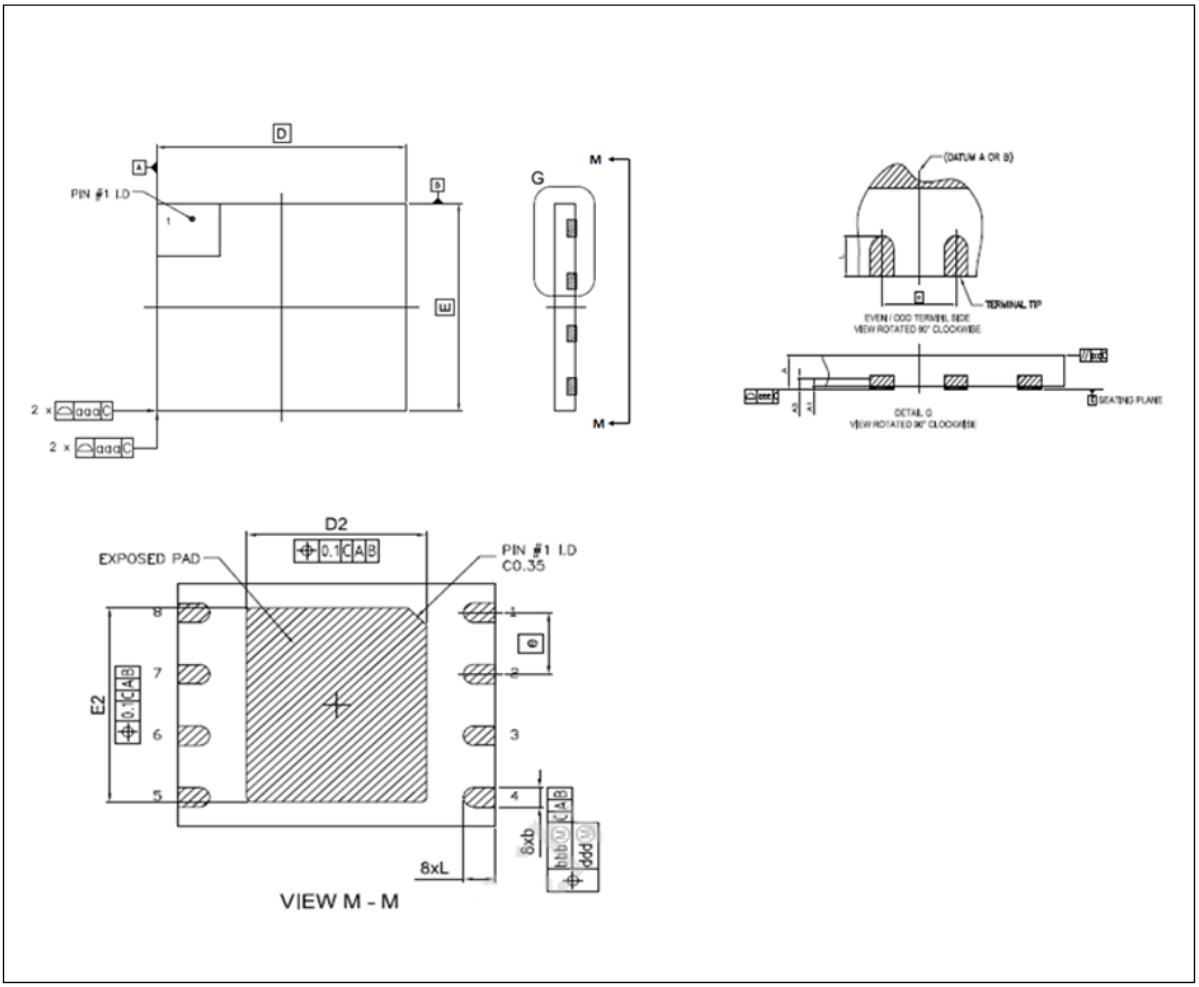
This section provides specific information for concerning the SMD package used by SIM cards in M2M communications. This SMD package attributes are compliant to ETSI TS 102 671 specifications and is called M2M Form Factor 2 (MFF2).

Package Mechanical Data and Outline

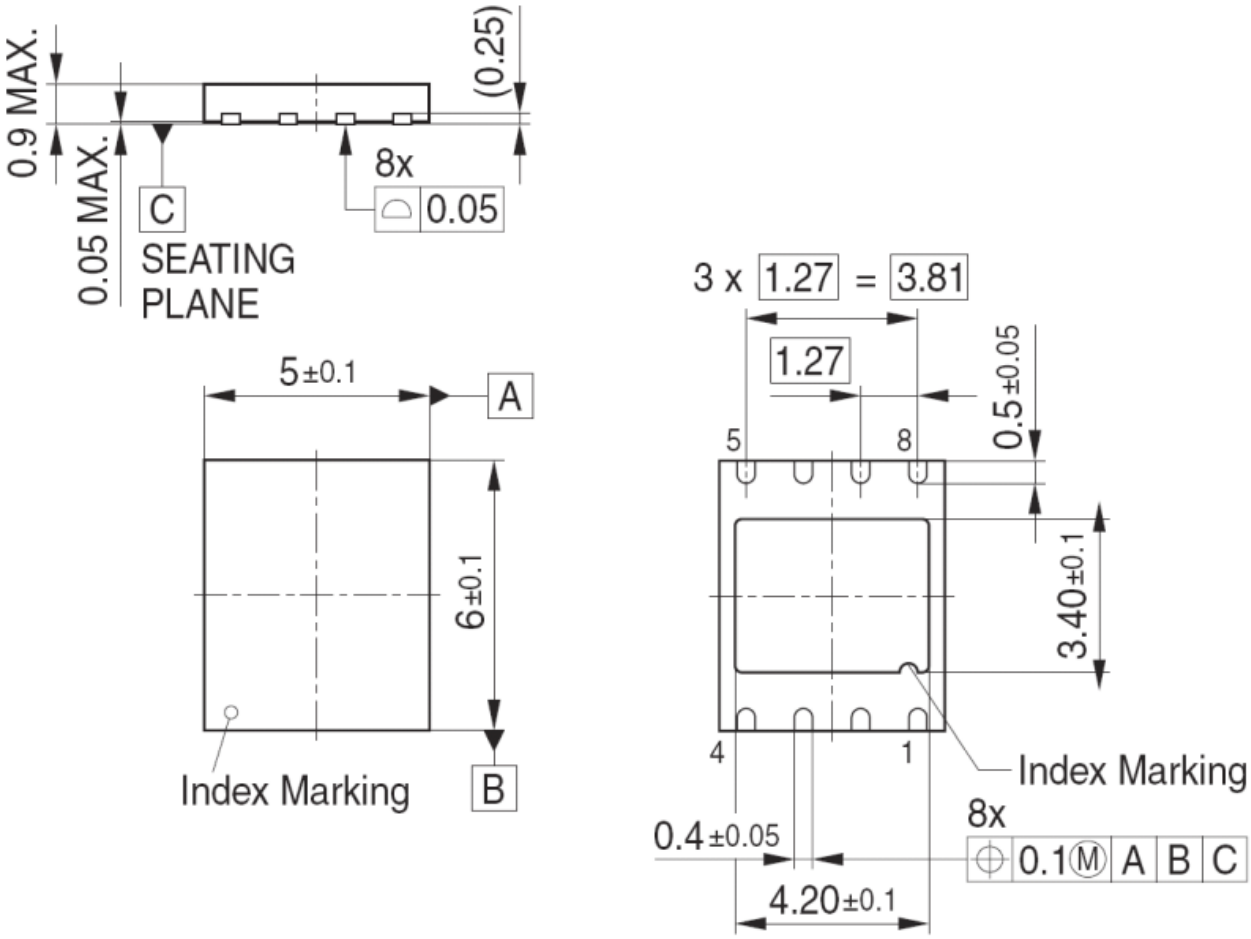
eSIM



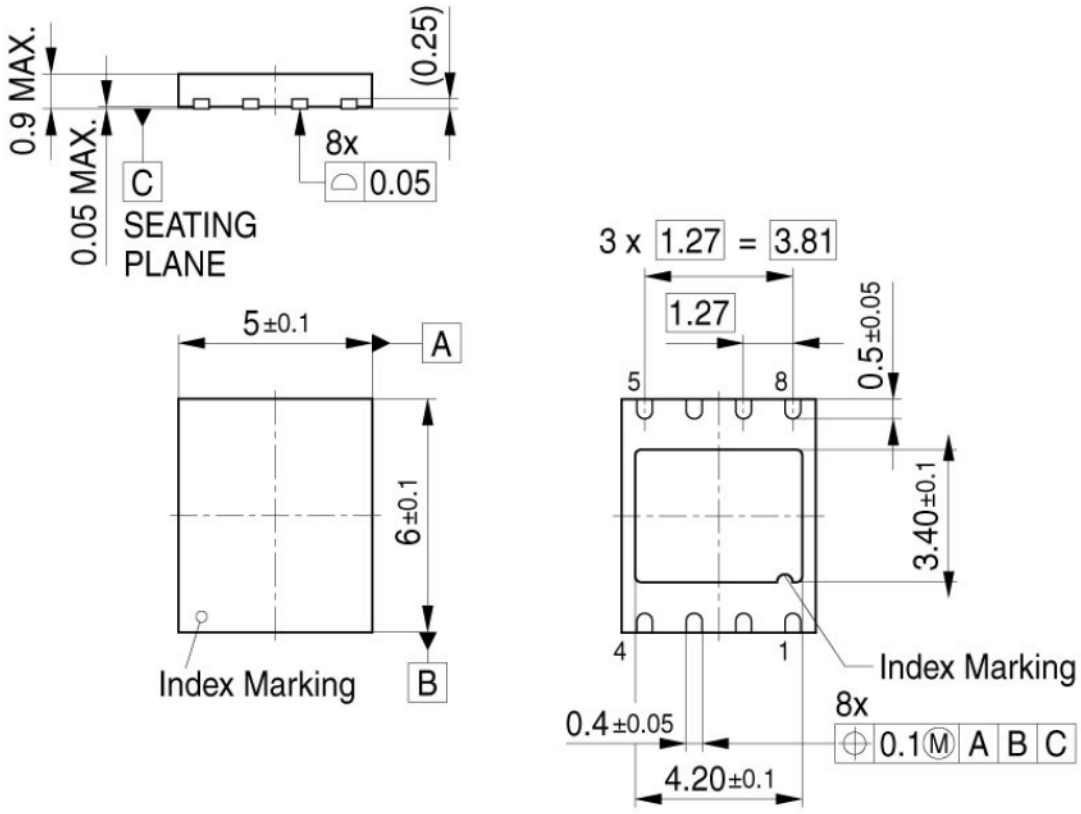
Dimensional References							unit: mm
Ref.	MIN	NOR	MAX	Ref.	MIN	NOR	MAX
A	0.70	0.75	0.80	E	4.90	5.00	5.10
A1	0.00	—	0.05	D1	3.30	3.40	3.50
A2		0.203 BCS		E1	3.90	4.00	4.10
D	5.90	6.00	6.10	b	0.35	0.40	0.45
e		1.27		L	0.55	0.60	0.65
px	0.4	0.6	0.8	py	0.4	0.6	0.8
pin1	0.25	0.35	0.45				



DIM	MIN	NOM	MAX	NOTES
A	0.550	0.600	0.650	1 Dimensioning & toleranceing confirm to asme y14.5-1994. 2 All dimensioins are in millimeters. angles are in degrees. 3 Dimensions b applies to metallized terminal. 4 Coplanarity applies to the exposed heat slug as well as the terminal. 5 Radius on terminal is optional.
A1	0.00		0.05	
A3	0.203 REF			
b	0.30	0.40	0.50	
D	5.85	6.00	6.15	
E	4.85	5.00	5.15	
D2	3.30	3.40	3.50	
E2	3.90	4.00	4.10	
c	1.27 BSC			
L	0.45	0.60	0.75	
aaa	0.10			
bbb	0.10			
ccc	0.10			
ddd	0.05			
ccc	0.08			



MFF2 6x5mm, 1.27mm pitch - package outline



The central area is not electrically connected (i.e. it is insulated) and may serve as anchors to reinforce the mechanical attachment of the MFF2 to the Printed Circuit Board.

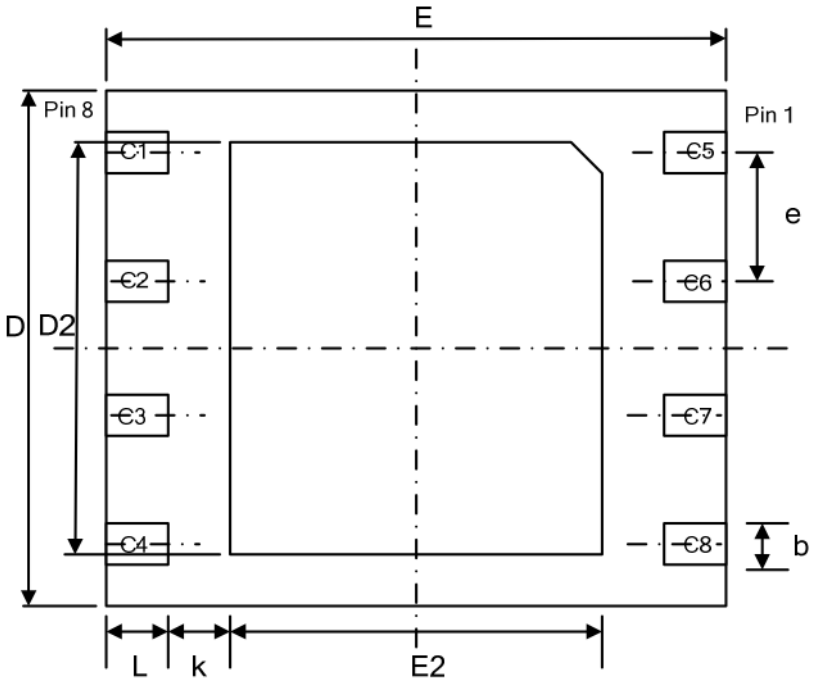
Package Pinout and mapping of Contacts

Common for all the eSIM and eUICC products.
Pin assignment for the contacts C1 to C8 are defined as per ETSI TS 102.221 and TS 102.671.

Pin #	ISO 7816	Signal	Purpose
1 (Index)	C5	GND	Ground
2	C6	NC	Reserved
3	C7	I/O	Input or Output for ISO interface
4	C8	NC	Reserved

Pin #	ISO 7816	Signal	Purpose
5	C4	NC	Reserved
6	C3	CLK	Clock signal input
7	C2	RST	Reset signal input
8	C1	VCC	Supply power input

NC: Not physically/electrically connectd

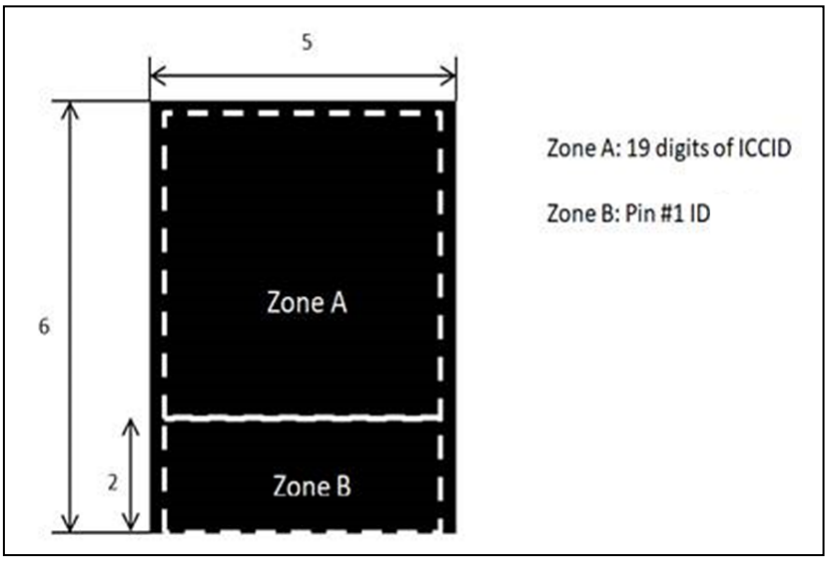


MFF2 bottom view

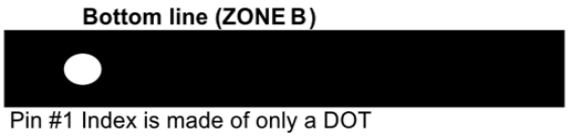
The contacts shall be located on the front of the card. The dimensions are referenced to the left and upper edges of the front surface of the card as defined in ISO/IEC 7810. Each numbered contact shall be assigned as specified in ISO/IEC 7816-3 where C4 and C8 are not connected (NC). Unused contact areas shall be either non-conductive or electrically isolated from any other contact area in order to avoid potential short circuit in interface devices.

Laser Markings

4.3.3.1 eSIM

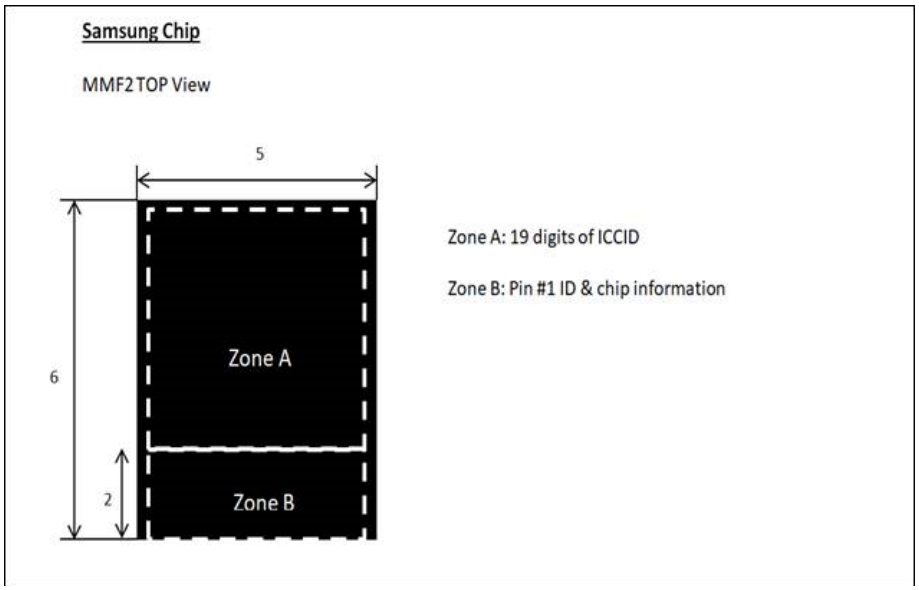


ZONE A: ICCID (19digits) is printed in 4 lines.



Pin #1 Index is made of only a DOT

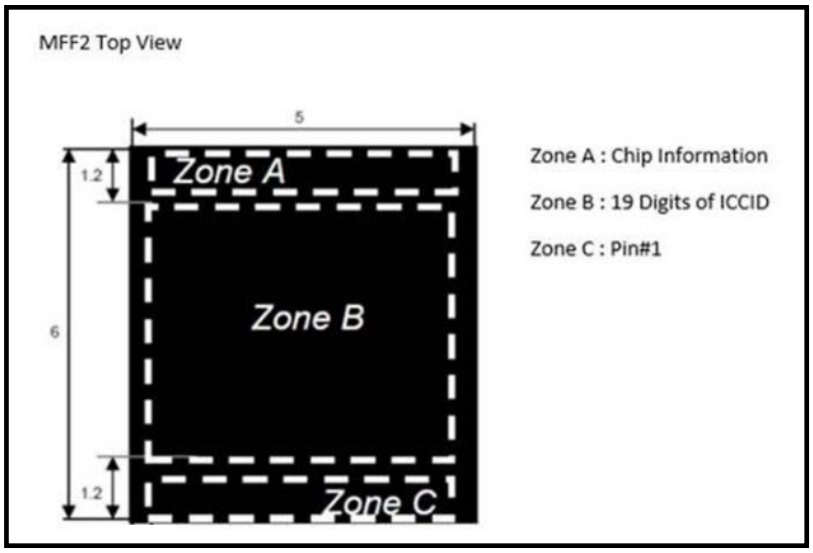
eSIM



ZONE A: ICCID (19digits) is printed in 4 lines.
ZONE B: (Fixed Markings): This area is not customizable and will be sued according to supply source.

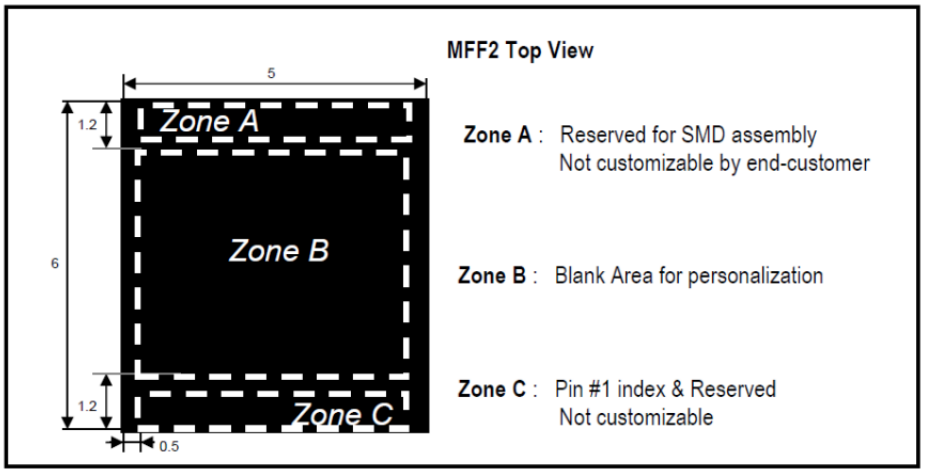
Dot and IC vender specific code are printed.

eSIM



ZONE B: ICCID (19digits) is printed in 4 lines.
ZONE C: PIN#1. Dot and line are printed.

eUICC

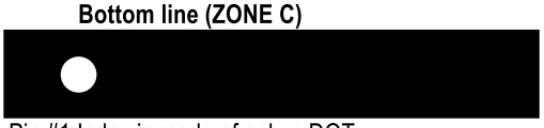


ZONE B: 24 last digits of EID.
ZONE A&C (Fixed Markings): These areas are not customizable and will be sued according to supply source.

Top Line (ZONE A)

Top Line shows manufacturer part #

Bottom line (ZONE C)



Pin #1 Index is made of only a DOT

Comon legend:

H □□□□- DataCode

XXX - Lot number

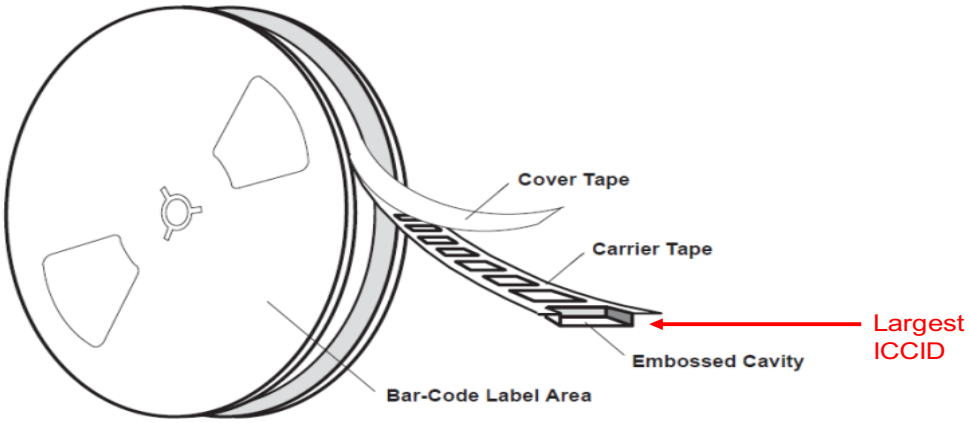
Tape and Reel Packing

Common for both eSIM and eUICC.

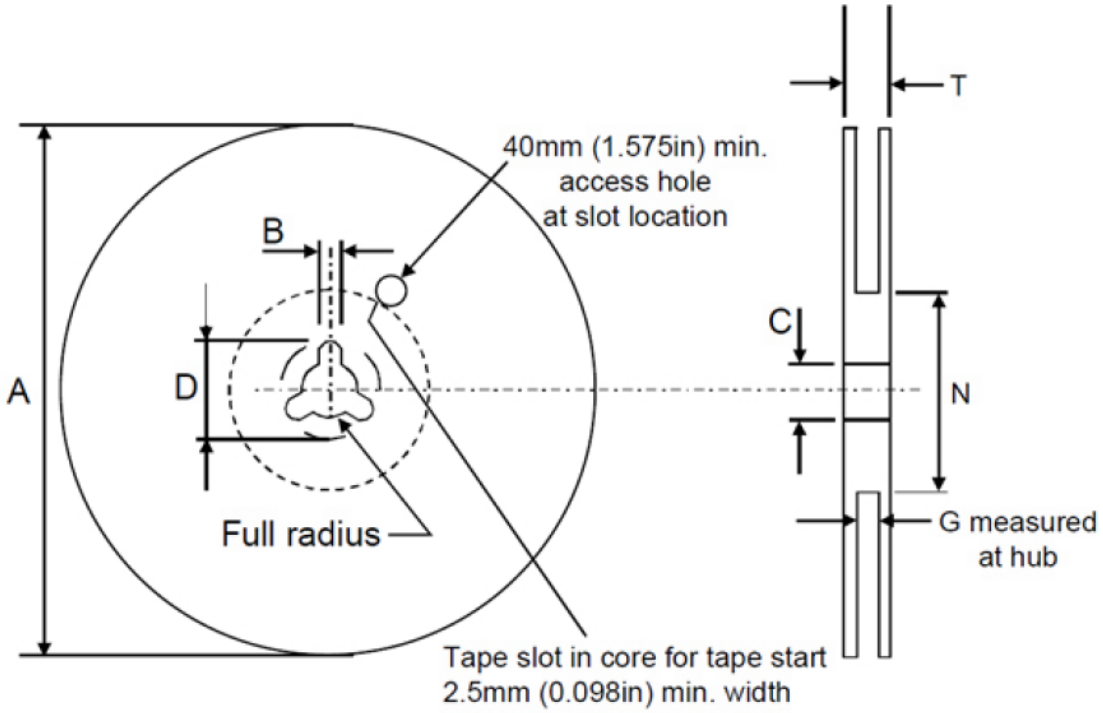
Surface-mount packages are supplied with Tape and Reel packing.

- Quantity per reel: 3000 units
- Material: Styrofoam, electrically conductive
- Surface resistance: 10^2 < R < 10^12 ohms

Reel size	Tape size	A Max.	B Min.	C	D Min.	G Max.	N Min.	T Max.	Unit
13"	12 mm	330	1.5	13 ±0.25	20.2	12.6	100	18.4	mm



Note: the smallest ICCID is the most-inside, the largest ICCID is the outmost.

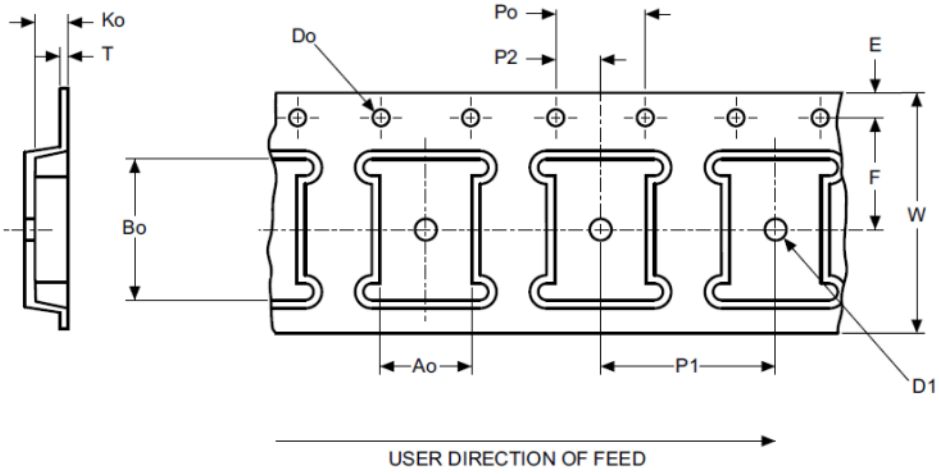


Embossed Carrier Tape

Typically, the carrier tape is constructed from a polystyrene (PS) or PS-laminate film. The uniform film thickness is 0.2m, to 0.4mm, depending on the size and weight of the component carried by the tape.

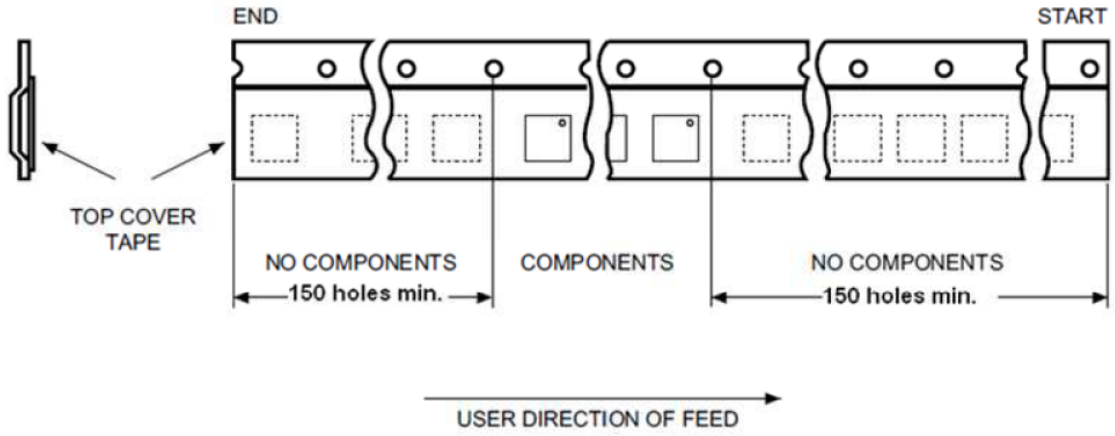
-Cover tape's surface resistance: 10^5 Ohms/sq

-Carrier tape's surface resistance: 10^5~10^9 Ohms/sq



Package	A0	B0	K0	D1 Min.	P1	P2	D0	P0	E	F	W	T Max.	Unit
MFF2	5.3 ±0.1	6.3 ±0.1	1.2 ±0.1	1.5	8 ±0.1	2 ±0.1	1.55 ±0.05	4 ±0.1	1.75 ±0.1	5.5 ±0.1	12 ±0.3	0.3 ±0.05	mm

Leader and Trailer



Note: *Min. trailer length : 160 mm and min. leader length: 400 mm*

Moisture Sensitivity

Plastic IC packages absorb moisture from the surrounding environment. This is a typical characteristic of the materials (mold compound and die attach) used in the construction of plastic packages.
The moisture inside the package increases or decreases to reach the relative humidity (RH) of the surrounding environment. Weight gain/loss analysis is used to determine the time it takes for a package to reach moisture saturation or the time required for removing it. This information is used to specify maximum exposure times and minimum dry-baking time.

eSIM

Moisture Sensitivity Levels

FLOOR LIFE		SOAK REQUIREMENTS			
		STANDARD		ACCELERATED EQUIVALENT	
TIME	CONDITIONS	TIME (hours)	CONDITIONS	TIME (hours)	CONDITIONS
168 hours	≤30°C/60% RH	192 +5/-0	30°C/60% RH	40 +1/-0	60°C/60% RH

4.3.7.2 eSIM

LEVEL	FLOOR LIFE			SOAK TIME		
	CONDITIONS		TIME	TIME(HOURS)	CONDITIONS	
	TEMPERATURE (℃)	RH (%)			TEMPERATURE (℃)	RH (%)
3	≦30	60	168 hours	192	30	60

4.3.7.3 eSIM

LEVEL	FLOOR LIFE			SOAK TIME		
	CONDITIONS		TIME	TIME(HOURS)	CONDITIONS	
	TEMPERATURE (℃)	RH (%)			TEMPERATURE (℃)	RH (%)
3	≦30	60	168 hours	192	30	60

Floor Life for Different Package Moisture-Sensitivity Levels

LEVEL	FLOOR LIFE			SOAK TIME		
	CONDITIONS		TIME	TIME (HOURS)	CONDITIONS	
	TEMPERATURE (°C)	RH (%)			TEMPERATURE (°C)	RH (%)
1	≤30	90	Unlimited	168	85	85

Floor Life for Different Package Moisture-Sensitivity Levels

LEVEL	FLOOR LIFE			SOAK TIME		
	CONDITIONS		TIME	TIME (HOURS)	CONDITIONS	
	TEMPERATURE (°C)	RH (%)			TEMPERATURE (°C)	RH (%)
1	≤30	90	Unlimited	168	85	85

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