

TSMC9000

IP Tagging Specification

V1.3

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Specification – Hard IP (1/2)

- IP tagging implementation has to follow VSIA's IP tagging standard requirement and tsmc's IP tagging specification
 - Unique IP tag for every product – follow *IP tag naming rule*
 - Must tagging layer: *IP(63;63) and OD*
 - Must tag on *top cell of one IP*
 - Follow *IP tag format*
- IP tag naming rule
 - Consistent across all entries to the required fields
 - Maximum length to each field is 512 characters
 - Must cover following fields
 - ◆ Vendor (company name)
 - ◆ Product (product information)
 - ◆ Version (product version information)
 - ◆ *_Instance_tag* (instance or cell name) : This field's a must for standard cell library, IO library, & memory compiler but optional for other types of IP
 - ◆ *_IP_type* : This field is to identify the IP type and the definition must follow TSMC standard.
 - Optional fields
 - ◆ Metric (area size)

Specification – Hard IP (2/2)

● IP tag format

■ Tagging layer and physical location

- ◆ Must tagging layers – IP(63;63) and OD in layout original point(0;0)
 - OD tag for tech node 0.15um and below: OD(6;0)
 - OD tag for tech node above 0.15um: OD(3;0) & Pdiff (11;0)
 - Must tag on *top cell* of one IP
- ◆ Recommended tagging layers – all layers

■ Syntax

- ◆ &+(space)+key word+(space)+string
 - “string” is defined by users
- ◆ Key word: “Vendor”, “Product”, “Version”, “_Instance_tag”, “_IP_type”
- ◆ Key word is case sensitive: three types are acceptable
 - 1st letter is capitalized & others are all lower case
 - All letters are upper case
 - All letters are lower case
- ◆ Space inside string is not allowed
 - For example: “tsmc n65g sram sp”

IP tag example – Hard IP

& **Vendor** tsmc

& **Product** ts28sram_hs_1m

& **Version** 1.0

& **Metric** 675000.54

& **_Instance_tag** hs_32768x80m16b4_1

& **_IP_type** Memory:SRAM_Compiler

IP Type Look Up table – Hard IP

Group	IP_type	IP_type tag
Analog	Bandgap	Analog:Bandgap
	Others	Analog:Others
	POR	Analog:POR
	Temperature Sensor	Analog:Temperature_Sensor
	VR	Analog:VR
General Function		General_Function
Memory	CAM	Memory:CAM
	Metal Fuse	Memory:Metal_Fuse
	ROM	Memory:ROM
	Register File	Memory:Register_File
	SRAM Compiler	Memory:SRAM_Compiler
	SRAM Macro	Memory:SRAM_Macro
Mixed-Signal IP	ADC	Mixed-Signal_IP:ADC
	AFE	Mixed-Signal_IP:AFE
	CODEC	Mixed-Signal_IP:CODEC
	DAC	Mixed-Signal_IP:DAC
	DLL	Mixed-Signal_IP:DLL
	Others	Mixed-Signal_IP:Others
	PLL	Mixed-Signal_IP:PLL
NVM	Electrical Fuse	NVM:Electrical_Fuse
	EmbFlash	NVM:EmbFlash
	MTP	NVM:MTP
	OTP	NVM:OTP
PHY	DDR PHY	PHY:DDR_PHY
	HDMI	PHY:HDMI
	MIPI PHY	PHY:MIPI_PHY
	Others	PHY:Others
	PCI Express	PHY:PCI_Express
	SATA	PHY:SATA
	Serdes	PHY:Serdes
	USB PHY	PHY:USB_PHY
XAUI	PHY:XAUI	
Processor + DSP	DSP	Processor+_DSP:DSP
	GPU	Processor+_DSP:GPU
	Processor	Processor+_DSP:Processor

Group	IP_type	IP_type tag
Specialty I/O	Crystal Oscillator	Specialty_I/O:Crystal_Oscillator
	DDR I/O	Specialty_I/O:DDR_I/O
	HSTL	Specialty_I/O:HSTL
	I2C application I/O	Specialty_I/O:I2C_application_I/O
	LVDS	Specialty_I/O:LVDS
	Memory I/O	Specialty_I/O:Memory_I/O
	Others	Specialty_I/O:Others
	PCIX	Specialty_I/O:PCIX
	PECL	Specialty_I/O:PECL
	SSTL	Specialty_I/O:SSTL
USB I/O	Specialty_I/O:USB_I/O	
Standard Cell		Standard_Cell
Standard I/O/ESD	ESD	Standard_I/O/ESD:ESD
	Standard I/O	Standard_I/O/ESD:Standard_I/O
eDRAM/1 TRAM	1TRAM	eDRAM/1_TRAM:1TRAM
	eDRAM	eDRAM/1_TRAM:eDRAM

Specification – Soft IP

- **Soft IP partners have to educate customers to follow the spec and implement soft IP tags in their hardened IPs**
- **The specification follows Hard IP, except the discrepancy below**
- **Discrepancy**
 - **Must add the prefix, & _Soft-IP**
 - **Must cover four fields**
 - ◆ Vendor (company name)
 - ◆ Product (product information)
 - ◆ Version (product version information)
 - ◆ IP Type (IP category)
 - **Must add key words, vendor, product, version, ip_type before string**
 - ◆ These four keywords must be lowercase
 - **Must add the double quote(“) & comma(,) to separate each field**
 - ◆ The space is must between keyword vendor, product, version, ip_type and quote(“).
 - **Must place prefix (& _Soft-IP) and four fields on the same line**
 - ◆ The maximum length is 512 characters
 - **All merged soft IPs still have to be tagged even though those soft IPs are incorporated already into one soft IP**

IP tag example – Soft IP

- **Soft-IP tag format**

- `& _Soft-IP "vendor company-name", "product product-information", "version product-version-information", "ip_type IP_type-information"`

- **Example:**

- One hardening IP is hardened from one soft IP.
 - ◆ `& _Soft-IP "vendor A1", "product B1", "version v1.0", "ip_type NVM:BISTR"`
- One hardening IP is hardened from more than one soft IPs
 - ◆ `& _Soft-IP "vendor A1", "product B2", "version v1.0", "ip_type NVM:BISTR"`
 - ◆ `& _Soft-IP "vendor A2", "product B3", "version v1.0", "ip_type Controller:LCD"`
 - ◆ `& _Soft-IP "vendor A3", "product B4", "version v1.0", "ip_type Controller:USB"`

IP Type Look Up table – Soft IP

Group	IP_type	IP_type tag
A/V CODEC	Video CODEC	A/V_CODEC:Video_CODEC
Controller	Ethernet	Controller:Ethernet
	LCD	Controller:LCD
	Memory	Controller:Memory
	Others	Controller:Others
	PCIe	Controller:PCIe
	SATA	Controller:SATA
	USB	Controller:USB
	General Function	Controller:General_Function
	Interconnect Fabric	Controller:Interconnect_Fabric
NVM	BISTR	NVM:BISTR
Processor + DSP	DSP	Processor+_DSP:DSP
	GPU	Processor+_DSP:GPU
	Processor	Processor+_DSP:Processor
	Security	Processor+_DSP:Security
eDRAM/1TRAM	BISTR	eDRAM/1TRAM:BISTR

Template Revision History

Version	Date	Author	Description
1.0	Nov-16, 2012	Eric Luo Anthony Lin	First release
1.1	Jan-04, 2013	Eric Luo Anthony Lin	Add the specification for soft IP
1.2	Mar-22, 2013	Andy Chu	Add IP type field
1.3	May- 08,2013	Yi-Fan Liao	Refine Soft-IP tag format