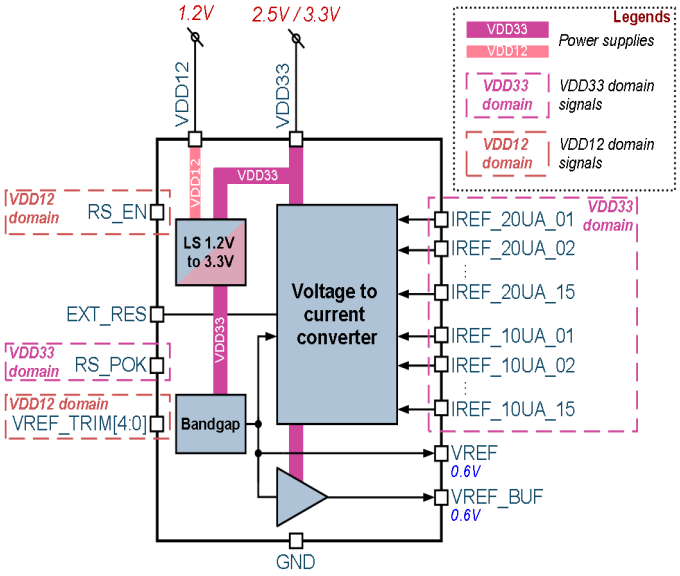
0.6V/10uA, 20uA Bandgap and V2I converter (Voltage to current)

OVERVIEW

055TSMC_BGV_02 is a reference voltage and current source that consists of bandgap voltage reference, voltage-to-current converter and current-voltage buffer. Voltage-to-current converter is based on external resistor and thus could be considered as process and temperature independent current reference. The bandgap produces on pin out voltage level around 0.6V, which adjusted by a trimming codes. Bandgap Voltage-to-Current (V2I) converter generates required 10uA/20uA nominal values of reference current to analog blocks.

IP technology: TSMC 55nm MS RF.
IP status: pre-silicon verification.
GDS area: 0.425mm^2.
Silicon area: 0.344mm^2.



ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Conditions		Value min	Value typ.	Value max	Units
Supply voltage	V_{DD33}	-		2.25	3.3	3.6	V
	V_{DD12}	-		1.14	1.2	1.26	V
Operating temperature range	T_j	-		-40	+27	+85	°C
Maximum load current	I_{LOAD}	@V_{REF_BUF} output		-	-	200	uA
Capacitive load	C_{LOAD}	@V_{REF} output		-	1	-	pF
		@V_{REF_BUF} output		-	100	-	pF
Current consumption	I_{DD33}	@V_{DD33}, Tj=-40÷85°C		-	172.8	188.7	uA
	I_{DD12}	@V_{DD12}, Tj=-40÷85°C		-	3.4	9.3	nA
Shutdown current	I_{STB_DD33}	@V_{DD33}, RS_EN = "0"		-	16.8	36.9	nA
	I_{STB_DD12}	@V_{DD12}, RS_EN = "0"		-	3.4	9.2	
Reference voltage	V_{REF}	@V_{REF}, @V_{REF_BUF}		0.58	0.6	0.62	V
Reference voltage accuracy for VREF	ΔV_{REF}	Over Monte-Carlo simulation (process+mismatch)	w/o trimming	-	3.4	-	%
			with trimming	-	1	-	%
Reference voltage accuracy for VREF_BUF	ΔV_{REF_BUF}		w/o trimming	-	3.4	-	%
			with trimming	-	1	-	%
Output reference current	I_{REF_10u}	@external resistor 1%, T_j=-40÷85°C	@V_{DD33}	9.72	10.13	10.66	uA
			@V_{DD12}	9.72	10.08	10.66	
	I_{REF_20u}		@V_{DD33}	19.47	20.27	21.43	uA
			@V_{DD12}	19.41	20.16	21.23	
Reference current accuracy	ΔI_{REF_10u}	@IREF_10UA_01, @V_{DD12}		-	4.7	-	%
		@IREF_10UA_01, @V_{DD33}		-	4.8	-	
	ΔI_{REF_20u}	@IREF_20UA_01		-	4.5	-	
Power supply rejection ratio	$PSRR_{VREF}$	T_j=-40°C÷+85°C, V_{DD33}=3.0V÷3.6V, V_{DD12}=1.14V÷1.26V, C_{LOAD_VREF} = 1pF	@10kHz	-	34	-	dB
			@100kHz	-	36	-	
			@1MHz	-	56	-	
			@10MHz	-	57	-	
	$PSRR_{VREF\_BUF}$	T_j=-40°C÷+85°C, V_{DD33}=3.0V÷3.6V, V_{DD12}=1.14V÷1.26V $C_{LOAD\_VREF\_BUF}$=100pF	@10kHz	-	32	-	
			@100kHz	-	30	-	
			@1MHz	-	36	-	
			@10MHz	-	66	-	
Input logic-level high	V_{IH}	For digital inputs		0.9V_{DD12}	-	V_{DD12}+0.3	V
Input logic-level low	V_{IL}			-0.3	-	+0.3	V