

5G era is coming soon. Massive deployment is expected in 2021 worldwide. IMT-2020 defines eMBB, URLLC and mMTC which are keys to successful 5G communications. TMYTEK has developed a compact size Antenna-in-Package (AiP) for 5G beamforming applications. The AiP module scalable in size which can fit customer's various needs. Please contact TMYTEK for more details.

Our AiP is made ready to help users to prepare, design, test and deploy beamforming solutions for base stations and 5G researches. More details are outlined below.

Features

- Antenna-in-Package designed for 5G NR n261 band
- Operating Frequency: 27.5 to 28.5 GHz
- 2x4 series patch antenna array
- Up to 8 controllable RF channels
- Each channel provides:
 - 360° phase shifter coverage with 5.6° per step
 - RMS phase error: 4° (typical)
 - 15 dB attenuation range with 0.5 dB per step
 - RMS attenuation error: 0.3 dB (typical)
 - Input / Output matching: TBD
- T/R half duplex operation
- 5 ms T/R mode switching time (typical)
- 5 ms beamsteering time (typical) *1

System RF Specifications

Tested conditions: 8 channels, $f_{RF} = 28 \text{ GHz}$, $Z_{SYS} = 50 \Omega$ and $T_{AMB} = 25^\circ\text{C}$

Parameter	Conditions	Unit	Min.	Typ.	Max.
Operating Frequency Range	With 2x4 patch antennas	GHz	27.5	28	28.5
Number of Channels		---	---	8	---
Transmitter Maximum EIRP	Tx Mode	dBm	---	37	---
Transmitter Maximum Gain		dB	---	47	---
Maximum Receiver Power	Rx Mode	dBm	---	-55	---
Receiver Maximum Gain		dB	---	44	---
Beamsteering Range	Horizontal (Parallel to Long Edge)	deg	-45	---	+45
	Vertical	deg	-25	---	+25
3dB Beamwidth	Broadside, Horizontal	deg	-11	---	+11
	Broadside, Vertical	deg	-17.5	---	+17.5

*1 Beamsteering time is the time it takes for all 8 channels' gain and phase to change to reflect the new beamforming angle. The time here is dependent on the CPU speed of the PC in which the control interface (UI or API) is running on.

Single Channel RF Specification

Parameter	Conditions	Unit	Min.	Typ.	Max.
Operating Frequency Range		GHz	27.5	28	28.5
Phase Shifting Range		deg	---	360	---
Phase Shifting Step		deg	---	5.6	---
RMS Phase Error		deg	---	4	---
Attenuator Range		dB	---	15	---
Attenuator Step		dB	---	0.5	---
RMS Attenuation Error		dB	---	0.3	---
Return Loss		dB	---	TBD	---
Channel-to-Channel Isolation		dB	---	TBD	---

DC and Control Specification

Parameter	Conditions	Unit	Min.	Typ.	Max.
Power Consumption	Tx Mode	W	---	---	TBD
	Rx Mode	W	---	---	TBD
Supply Voltage		Vdc	---	TBD	---
T/R Switching Time	Between Tx and Rx modes	ms	---	5	---
Beamsteering Time* ¹	Dependent on CPU speed	ms	---	5	---

Dimension

Parameter	Condition	Unit	Length	Width	Height
Dimension		mm	28.4	20.5	1.2
Weight		g	---	TBD	---