MEDIATEK

MT7915+MT7975

Power Consumption & Thermal Characteristics

MT7621/MT7622 Thermal Characteristics

- MT7621

Symbol	Description	Performance	
		Typ	Unit
T_J	Maximum Junction Temperature (Plastic Package)	125	°C
θ_{JA}	Junction to ambient temperature thermal resistance for JEDEC 2L system PCB	27.1	°C/W
θ_{JA}	Junction to ambient temperature thermal resistance for JEDEC 4L system PCB	20.85	°C/W
θ_{JC}	Junction to case temperature thermal resistance	7.0	°C/W
θ_{JB}	Junction to board temperature thermal resistance	9.25	°C/W
ψ_{Jt}	Thermal Characterization parameter ΨJt for JEDEC 2L system PCB	3.7	°C/W
ψ_{Jt}	Thermal Characterization parameter ΨJt for JEDEC 4L system PCB	3.3	°C/W

Note:
JEDEC 51-9 system FR4 PCB size: 101.5x114.5mm (4"x4.5")

Table 2-1 MT7621A/S Thermal Characteristics

- MT7622

Symbol	Description	Performance	
		Typ	Unit
T_J	Maximum Junction Temperature (Plastic Package)	125	°C
θ_{JA}	Junction to ambient temperature thermal resistance[1] for JEDEC 2L PCB	24.48	°C/W
θ_{JA}	Junction to ambient temperature thermal resistance[1] for JEDEC 4L PCB	20.09	°C/W
θ_{JC}	Junction to case temperature thermal resistance	2.92	°C/W
θ_{JB}	Junction to case board thermal resistance	10.33	°C/W
ψ_{Jt}	Junction to the package thermal resistance for JEDEC 2L PCB	1.44	°C/W
ψ_{Jt}	Junction to the package thermal resistance for JEDEC 4L PCB	1.24	°C/W

NOTE: JEDEC 51-9 system FR4 PCB size: 101.5x114.5mm (4"x4.5")

MT7621/22+MT7915/7975 die power estimation table

Condition	Mean (NT*)	Mean (HT**)
MT7915+MT7975-iPA 2G @3.3V minicard power CCK-1M 4SS 23dBm Duty:96.5%	7W	7.7W
MT7915+MT7975-iPA @3.3V minicard power OFDM-6M 4SS 21dBm Duty:96.5%	6.8W	7.5W
MT7915+MT7975-iPA 2+5G@die power 2G CCK-1M 2SS 23dBm Duty:96.5% 5G OFDM-6M 2SS 21dBm Duty:96.5% (2x2 DBDC for AX1800)	7.2W	7.9W
MT7622B-iPA Worse case @die power CCK-1M 4SS 22dBm Duty:90%	6.5W	7.5W
MT7622E-iPA Worse case @die power	3.2W	
MT7622B-ePA Worse case @die power CCK-1M 4SS Duty:90%	4.4W	
MT7622D-ePA Worse case @die power CCK-1M 2SS Duty:90%	3.8W	4.18W
PMIC(MT6380)	1.3W	
MT7531 GigaSwitch (with 5port)	1.9W	2.31W
MT7621 (with 1Port)	2.6W	3.5W
MT7621 GigaSwitch per Port @1000M***	0.4W	0.48W

Condition	Mean (NT*)
MT7915+MT7975-ePA 2G @3.3V minicard power, w/o FEM,4SS	2W
MT7915+MT7975-ePA 5G @3.3V minicard power, w/o FEM,4SS	3.47W
MT7915+MT7975-ePA 2+5G @3.3V minicard power, w/o FEM (2x2 DBDC for AX1800)	3.83W

For thermal simulation, recommend HT average power consumption.

* NT(Normal temperature): Tj~100'C
** HT(High temperature): Chip Tj~125'C
*** MT7621 Giga per port power consumption :+0.4W(NT)/0.48W(HT)
e.g.
- 1 port: 0.4W(NT)/0.48W(HT)
- 5 port: 2W(NT)/2.4W(HT)

MT7915/MT7975 Thermal Characteristics

MT7915

Thermal characteristics without external heat sink in still air condition

Thermal Resistance θJA (°C /W) for JEDEC 2L system PCB.....23.7°C/W
Thermal Resistance θJA (°C /W) for JEDEC 4L system PCB.....16.7°C/W
Thermal Resistance θJC (°C /W) for JEDEC system PCB.....4.39 °C/W
Thermal Resistance θJB (°C /W) for JEDEC system PCB..... 2.28°C/W
Thermal Characterization parameter ΨJt (°C /W) for JEDEC 2L system PCB..... 1.5°C/W
Thermal Characterization parameter ΨJt (°C /W) for JEDEC 4L system PCB.....0.95 °C/W

NOTE: JEDEC 51-7 system FR4 PCB size: 76.2x114.3mm (3"x4.5")

MT7975

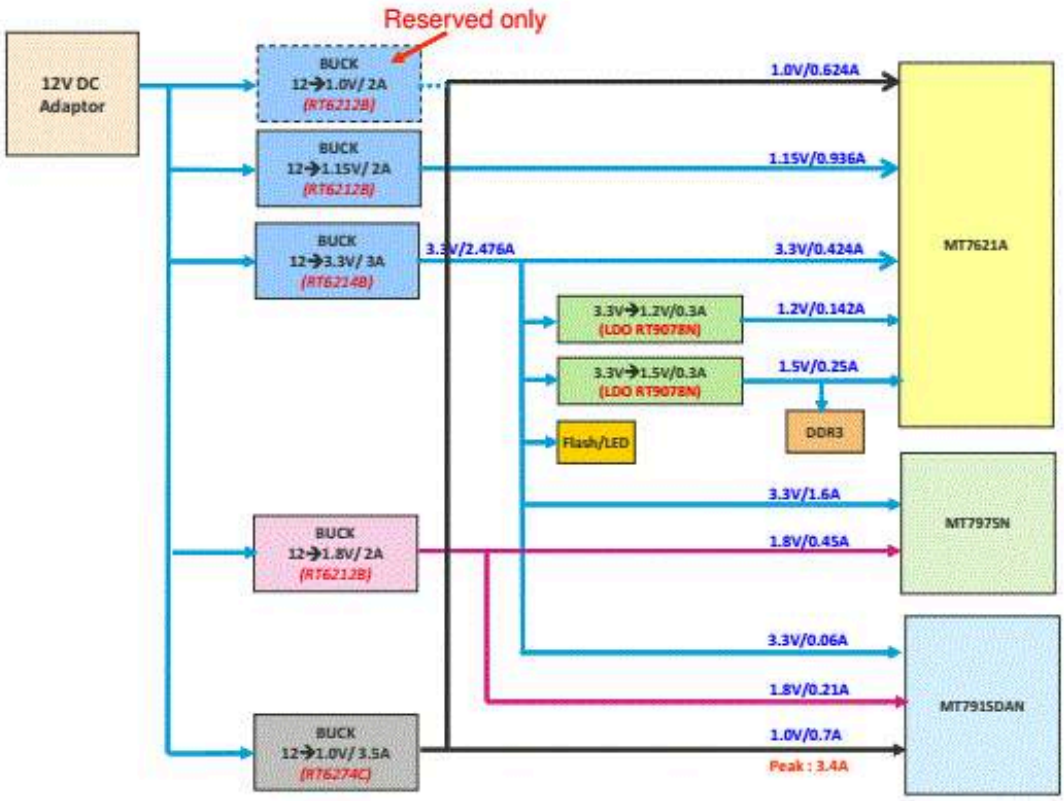
Thermal characteristics without external heat sink in still air condition

Thermal Resistance θJA (°C /W) for JEDEC 2L system PCB.....25.58°C/W
Thermal Resistance θJA (°C /W) for JEDEC 4L system PCB.....17.56°C/W
Thermal Resistance θJC (°C /W) for JEDEC system PCB.....5.67 °C/W
Thermal Resistance θJB (°C /W) for JEDEC system PCB.....2.57 °C/W
Thermal Characterization parameter ΨJt (°C /W) for JEDEC 2L system PCB.....1.94 °C/W
Thermal Characterization parameter ΨJt (°C /W) for JEDEC 4L system PCB.....1.2 °C/W

NOTE: JEDEC 51-7 system FR4 PCB size: 76.2x114.3mm (3"x4.5")

-AX1800
MT7621A+MT7915DAN+MT7975DN

MT7621+MT7915DAN+MT7975DN (W/O USB)



Example :
2G OFDM 6M & 5G OFDM 6M die power consumption = 5.7 + 1.1 + 4.2 = 11W *
2G CCK 1M & 5G OFDM 6M die power consumption = 6.1 + 1.1 + 4.2 = 11.4W *
* Die power only, power efficiency is not included.

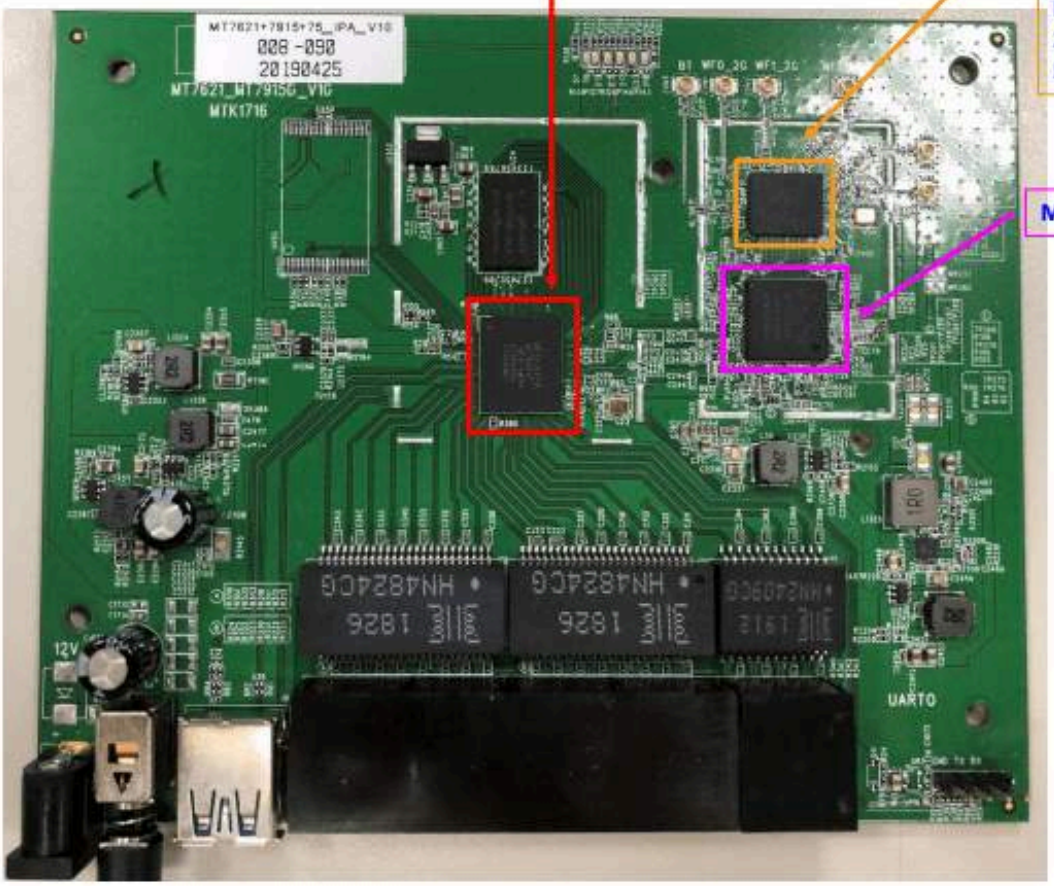
MT7621, 5p GPHY die power 4.2W

MT7975DN 2x2 DBDC 11ax iPA mode 5.7W
2G OFDM-6M 2SS 21dBm Duty:96.5%
5G OFDM-6M 2SS 21dBm Duty:96.5%

MT7975DN 2x2 DBDC 11ax iPA mode 6.1W
2G CCK-1M 2SS 23dBm Duty:96.5%
5G OFDM-6M 2SS 21dBm Duty:96.5%

MT7975DN 2x2 DBDC 11ax iPA mode 3.2W
2G HE40 MCS11 2SS 16.5dBm
5G HE80 MCS11 2SS 16dBm

MT7915DA Worse case @die power 1.1W



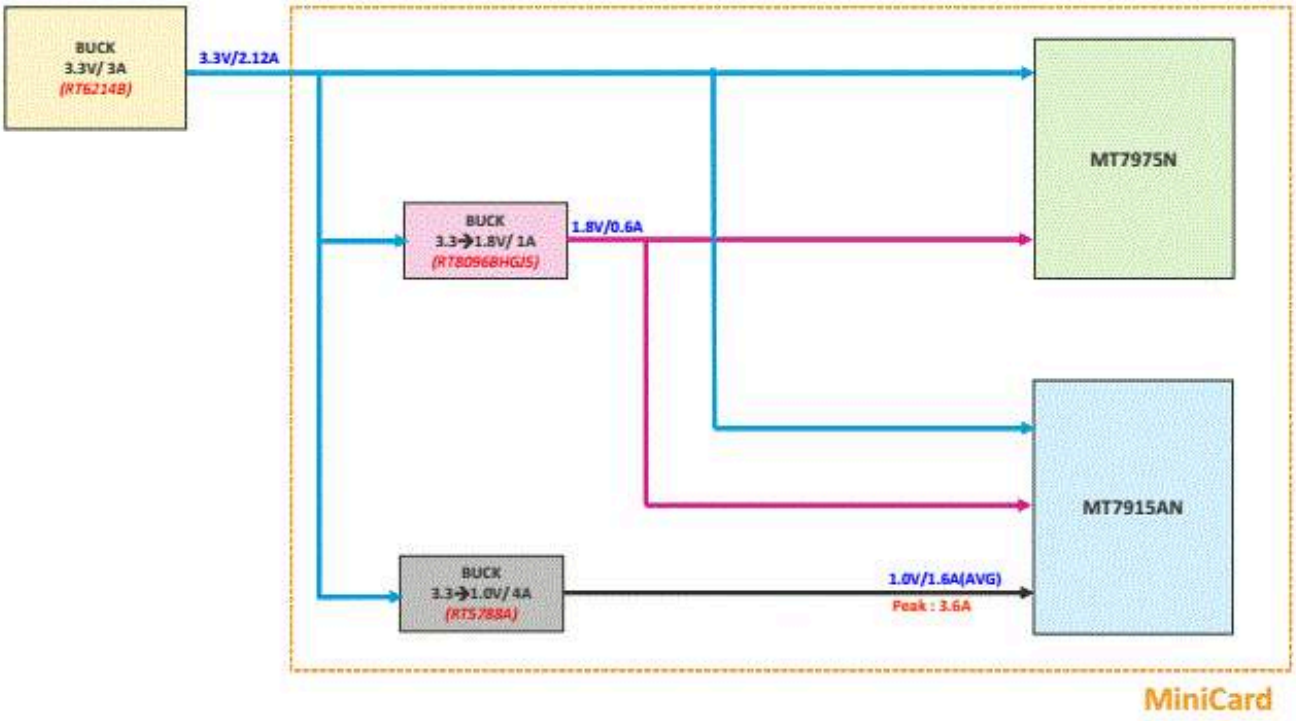
MT7621A+MT7915DA+MT7975D (AX1800)
Power consumption

Power Adapter @12V	MT7621A+MT7915DA 2.4G/5G iPA w/o USB	MT7621A+MT7915DA 2.4G/5G iPA w/o USB	MT7621A+MT7915DA 2.4G/5G iPA w/o USB
Operation Mode			
Mode	**Peak T-put** **G: HE 40MCS11, 2SS** **A: HE 80MCS11, 2SS**	**Low rate (worse case)** **G: OFDM 6M, 2SS** **A: OFDM 6M, 2SS**	**Low rate (worse case)** **G: CCK-1M, 2SS** **A: OFDM-6M, 2SS**
EPHY	**5P**	**5P**	**5P**
Tx Power	**G: 16.5dBm** **A: 16dBm**	**G: 21dBm** **A: 21dBm**	**G: 23dBm** **A: 21dBm**
CPU	*880M (2 core)*	*880M (2 core)*	*880M (2 core)*
DRAM Clock	*1200MHz*	*1200MHz*	*1200MHz*
Uplink (RX)	6.72W	5.52W	5.52W
/T-put	**1050Mbps**	**9.16Mbps**	**5.6Mbps**
Downlink (TX)	10W	10.6W	11W
/T-put	**1050Mbps**	**9.06Mbps**	**5.3Mbps**
STA associated	**4.44W**	**4.44W**	**4.44W**
STA un-associated	**4.32W**	**4.32W**	**4.32W**
Radio off	**3.24W**	**3.24W**	**3.24W**

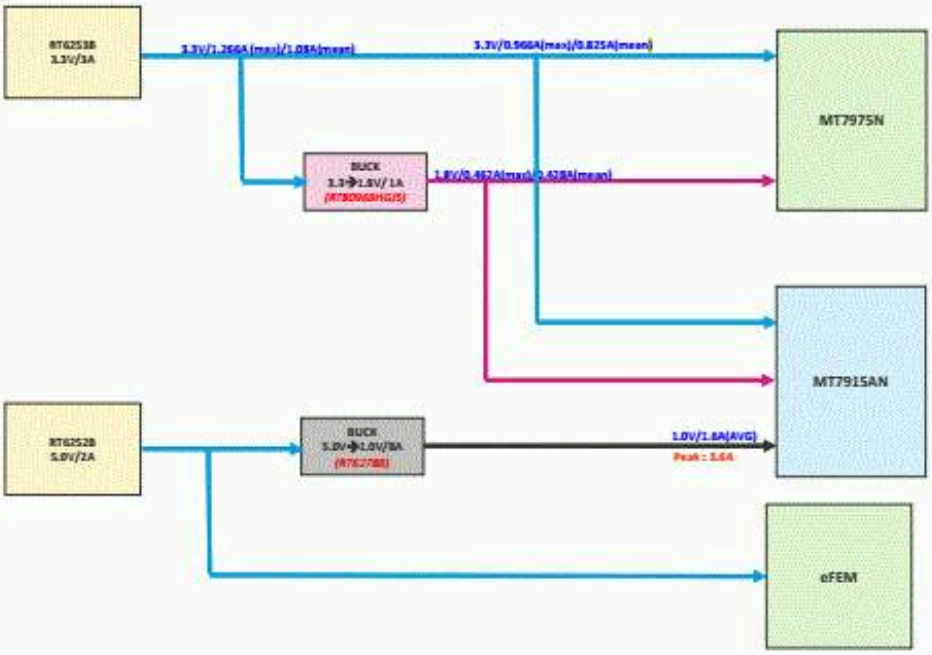
Uplink	Chariot RX (link at 1000M *1 or 5 ports)
Downlink	Chariot TX (link at 1000M *1 or 5 ports)
STA -Asso	STA Asso w/o traffic (4 ports floating)
Un-Asso	No STA Asso (4 ports floating)
Radio OFF	Radio Off (4 ports floating): shut down RF

MT7915AN+MT7975A/GN
Minicard Power Consumption

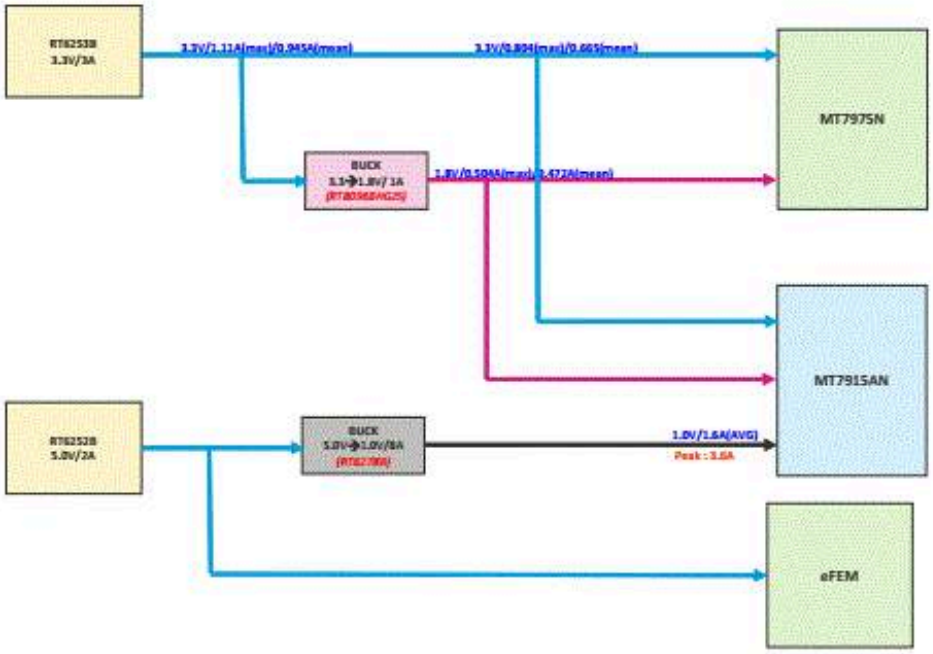
MT7915AN+MT7975A/GN iFEM MiniCard



MT7915AN+MT7975A 5G eFEM MiniCard



MT7915AN+MT7975GN 2.4G eFEM MiniCard



MT7915A+MT7975A/G Minicard (iPAiLNA)
Power consumption

	MT7915A+MT7975G minicard (5G, 4SS, iPA) @3.3V	
Mode	Peak T-put A: HE 80MCS11, 4SS	Low rate (worse case) A: OFDM 6M, 4SS
Tx Power	*16dBm*	*21dBm*
Uplink (RX) /T-put	2.44	1.91
	1400Mbps	4.6Mbps
Downlink (TX) /T-put	4.68	7.19
	1400Mbps	4.6Mbps
STA un-associated	1.49	1.49
Radio off	0.29	0.29

unit: W

	MT7915A+MT7975G minicard (2.4G, 4SS, iPA) @3.3V		
Mode	Peak T-put G: HE 40MCS11, 4SS	Low rate (worse case) G: OFDM 6M, 4SS	Low rate (worse case) G: CCK-1M, 4SS
Tx Power	*16.5dBm*	*21dBm*	*23dBm*
Uplink (RX) /T-put	1.82	1.65	1.65
	830Mbps	4.6Mbps	0.7Mbps
Downlink (TX) /T-put	4.46	5.84	6.27
	830Mbps	4.6Mbps	0.7Mbps
STA un-associated	1.35	1.35	1.35
Radio off	0.29	0.29	0.29

unit: W

MT7915A+MT7975A 5G Minicard (ePAeLNA) Power consumption

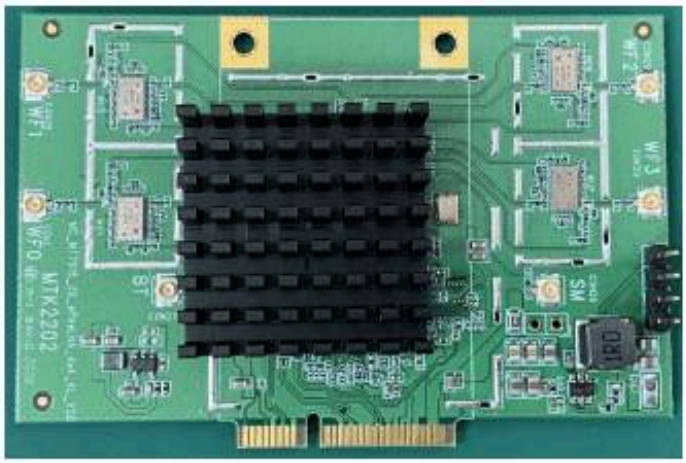
High Power FEM 5G: SKY85743-21	MT7622E+MT7915A+MT7975A (5G, 4SS, ePA)		
	Mode	Peak T-put A: HE 80MCS11, 4SS	Low rate (worse case) A: OFDM 6M, 4SS
Uplink (RX)	Tx Power	*A: 18dBm*	*A: 24.5dBm*
	MT7915+MT7975	2.13	1.57
	FEM @5V	1.95	1.30
	T-put	1400Mbps	4.5Mbps
Downlink (TX)	MT7915+MT7975	3.78	3.97
	FEM @5V	4.25	6.50
	T-put	1400Mbps	4.5Mbps
STA un-associated	MT7915+MT7975	1.43	1.43
	FEM @5V	1.00	1.00
Radio off	MT7915+MT7975	0.93	0.93
	FEM @5V	0.16	0.16

unit: W

MT7915A+MT7975A 2G Minicard (ePAeLNA) Power consumption

	High Power FEM 2G: SKY85331-11 minicard @ 3.3V, 5V	MT7622E +MT7915AN+MT7975AN (G, 4SS)		
		4x4 ePA	4x4 ePA	4x4 ePA
	Operation Mode			
	Mode	Peak T-put	Low rate (worse case)	Low rate (worse case)
		G: HE 40MCS11,4SS	G: OFDM 6M, 4SS	G: CCK 1M,4SS
	Tx Power	G:20.5dBm	G: 26.5dBm	G: 26.5dBm
Uplink (RX)	MT7915+MT7975	1.49	1.34	1.25
	FEM @5V	1.25	0.89	0.79
	/T-put	830Mbps	9.16Mbps	9.16Mbps
Downlink (TX)	MT7915+MT7975	2.63	3.36	2.5
	FEM @5V	5.50	7.50	7.50
	/T-put	830Mbps	9.16Mbps	9.16Mbps
STA un-associated	MT7915+MT7975	1.24	1.24	1.24
	STA un-associated FEM @5V	0.84	0.84	0.84
Radio off	MT7915+MT7975	0.79	0.79	0.79
	FEM @5V	0.09	0.09	0.09

unit: W



MT7915DA+MT7975D 2/5G DBDC Minicard (ePAeLNA) Power consumption

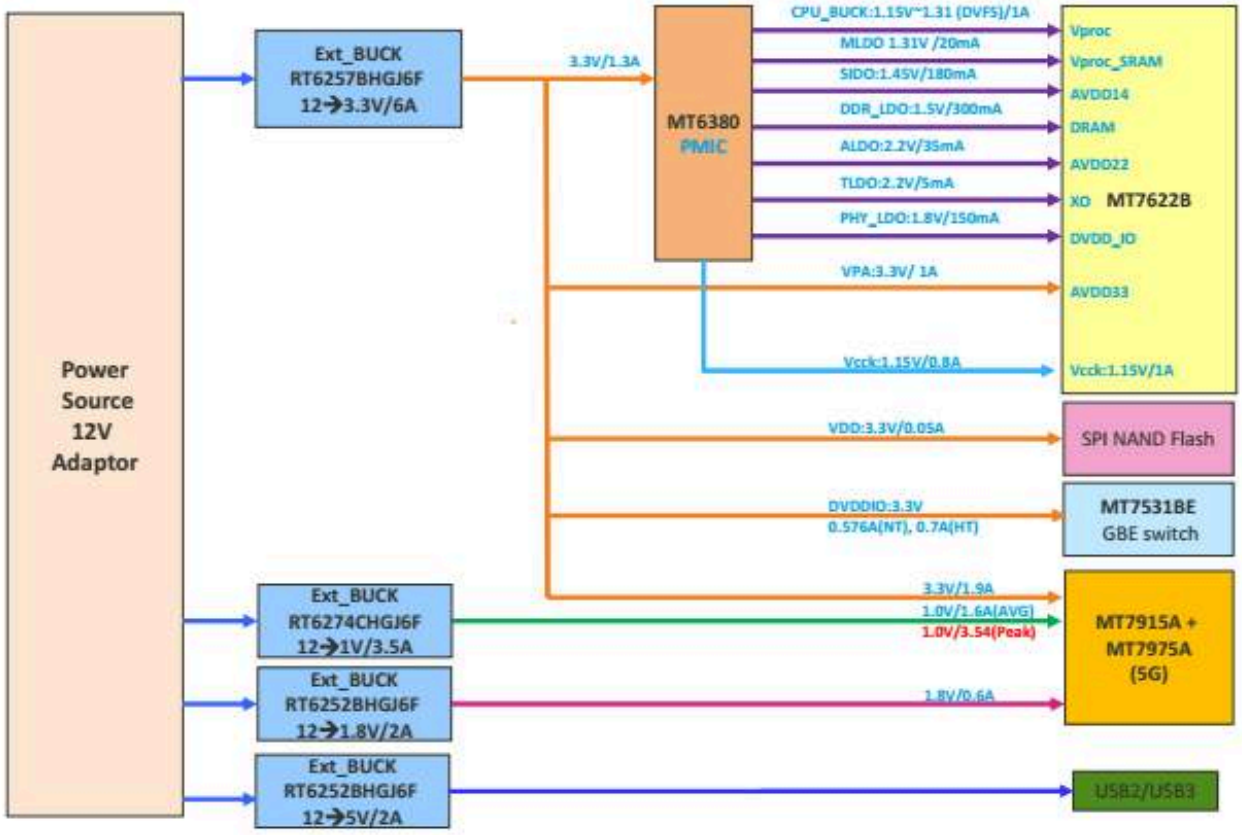
Mid-High FEM 2G: SKY85337 5G: SKY85755	MT7622E+MT7915DA+MT7975D (2G 2SS + 5G 2SS, ePA)		
	Mode	Peak T-put G: HE40MCS11, 2SS A: HE 80MCS11, 2SS	Low rate (worse case) G: OFDM 6M, 2SS A: OFDM 6M, 2SS
Uplink (RX)	Tx Power	*A: 19.5dBm* *A: 16.5dBm*	*G: 25.5dBm* *A: 24dBm*
	MiniCARD@3.3V	1.91	1.62
	FEM @5V	0.70	0.63
	T-put	1050Mbps	9.16Mbps
Downlink (TX)	MiniCARD@3.3V	3.14	3.83
	FEM @5V	3.75	6.00
	T-put	1050Mbps	9.16Mbps
STA un-associated	MiniCARD@3.3V	1.45	1.45
	FEM @5V	0.55	0.55
Radio off	MiniCARD@3.3V	0.42	0.42
	FEM @5V	0.00	0.00

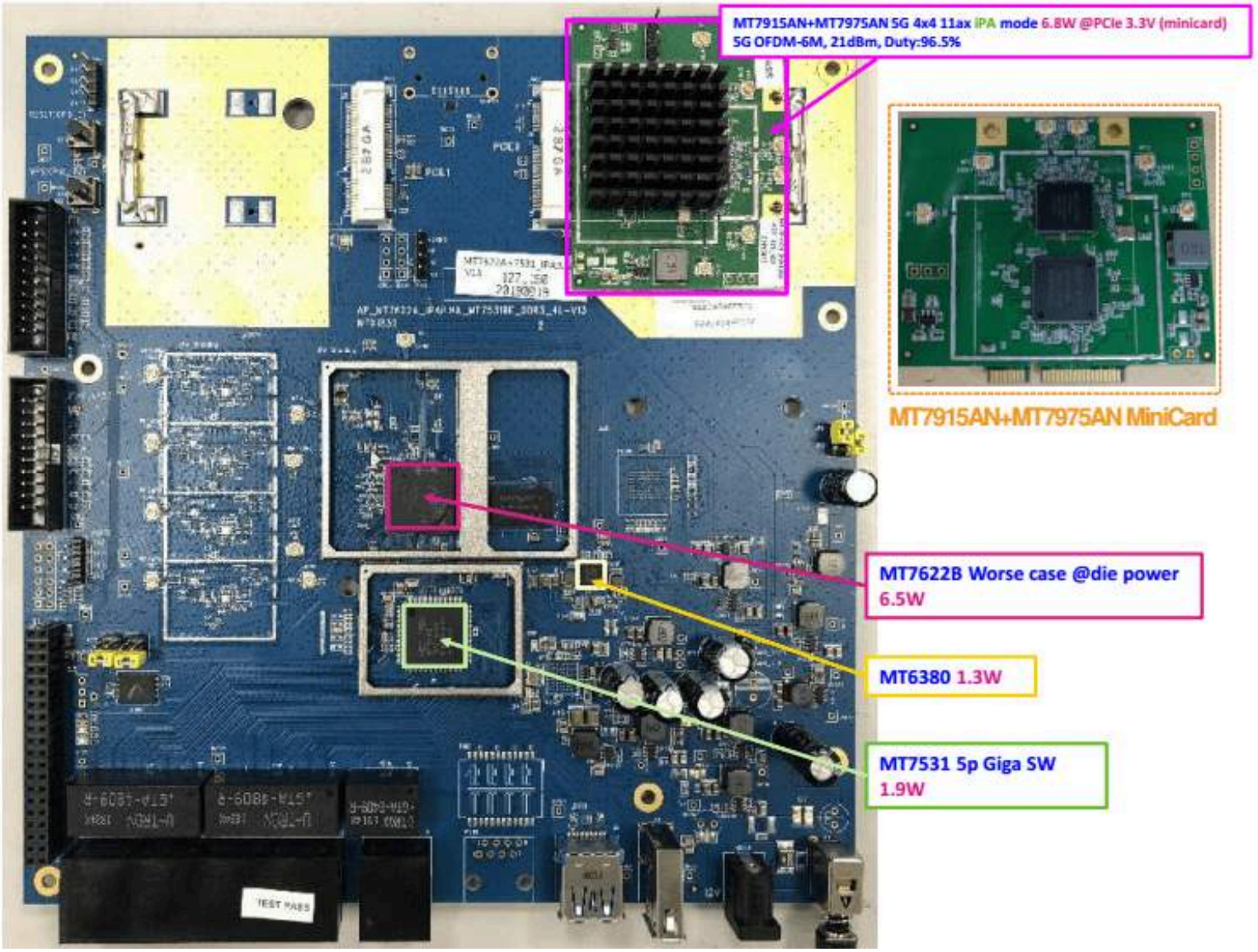
unit: W

MT7915AN+MT7975N 2/5G DBDC 11ax ePA mode
3.83W @ PCIe 3.3V (minicard)
7.25W @ FEM 5V
2G CCK-1M, 2SS, 25.5dBm, Duty:96.5%
5G OFDM-6M, 2SS, 24dBm, Duty:96.5%

-AX3200
MT7622B+MT7915AN+MT7975AN

AX3200 Power Topology
(MT7622B 2.4G_iPA + MT7915A+MT7975A 5G_iPA)




MT7915AN+MT7975AN 5G 4x4 11ax iPA mode 6.8W @PCIe 3.3V (minicard)
5G OFDM-6M, 21dBm, Duty:96.5%
MT7915AN+MT7975AN MiniCard
MT7622B Worse case @die power
6.5W
MT6380 1.3W
MT7531 5p Giga SW
1.9W

MT7622B+MT7915A+MT7975A Power consumption (AX3200)

Power Adapter @12V	MT7622B +MT7915A+MT7975A (A, 4SS) 2G iPA, 5G iPA	MT7622B +MT7915A+MT7975A (A, 4SS) 2G iPA, 5G iPA	MT7622B +MT7915A+MT7975A (A, 4SS) 2G iPA, 5G iPA
Operation Mode			
Mode	Peak T-put G: VHT 40MCS9, 4SS A: HE 80MCS11, 4SS	Low rate (worse case) G: OFDM 6M, 4SS A: OFDM 6M, 4SS	Low rate (worse case) G: CCK-1M, 4SS A: OFDM-6M, 4SS
EPHY	5P	5P	5P
Tx Power	G: 17.5dBm A: 16dBm	G: 21dBm A: 21dBm	G: 22dBm A: 21dBm
CPU	1.35G (2 core)	1.35G (2 core)	1.35G (2 core)
DRAM Clock	1600MHz	1600MHz	1600MHz
Uplink (RX) /T-put	9.6W	7.56W	7.56W
	1300Mbps	9.16Mbps	5.6Mbps
Downlink (TX) /T-put	12W	16.2W	17.4W
	1300Mbps	9.06Mbps	5.3Mbps
STA associated	6 W	6 W	6 W
STA un-associated	5.88W	5.88W	5.88W
Radio off	4.2W	4.2W	4.2W

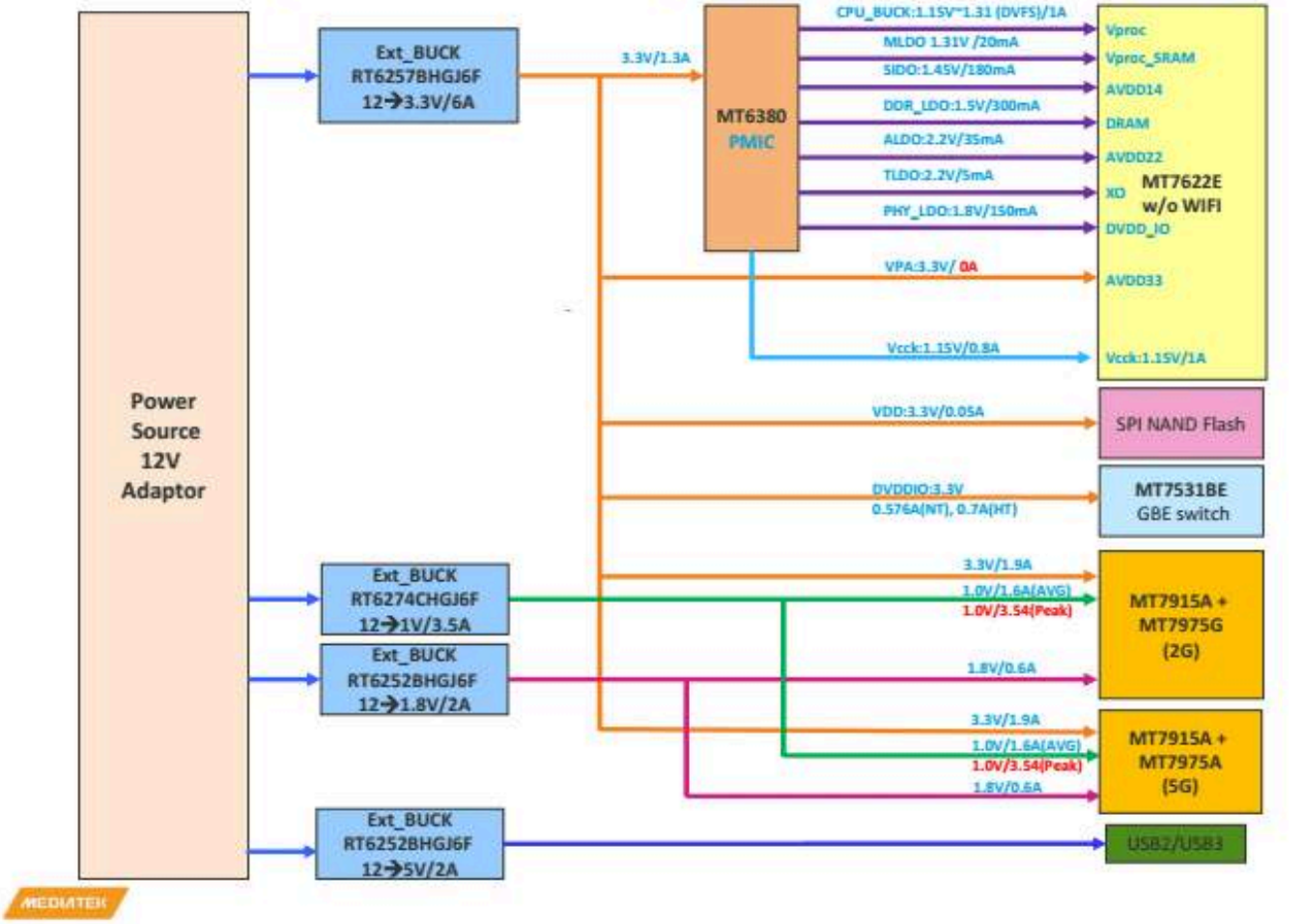
unit: W

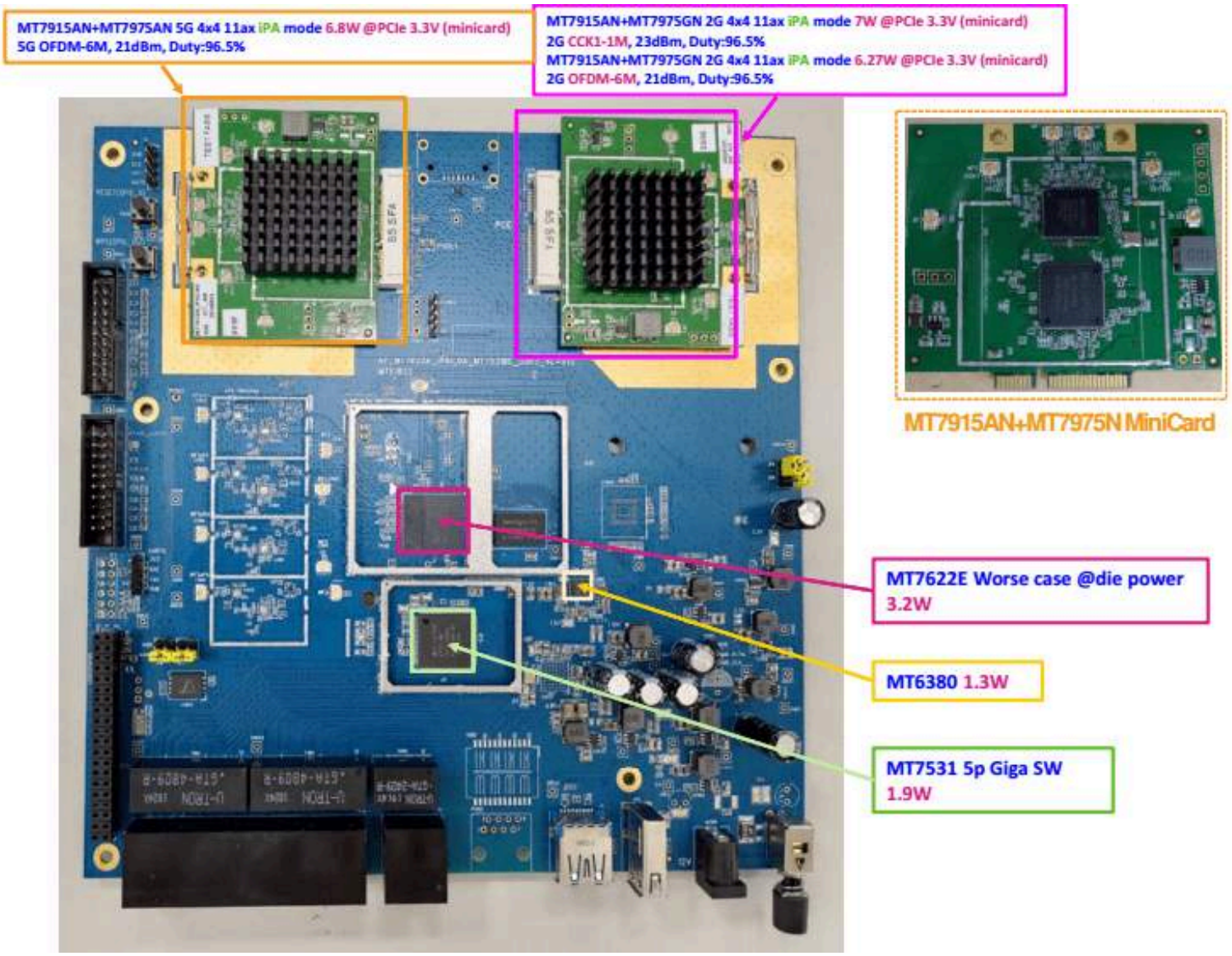
Uplink	Chariot RX (link at 1000M *1 or 5 ports)
Downlink	Chariot TX (link at 1000M *1 or 5 ports)
STA -Asso	STA Asso w/o traffic (4 ports floating)
Un-Asso	No STA Asso (4 ports floating)
Radio OFF	Radio Off (4 ports floating): shut down RF

AP-AX3600
MT7622E+(MT7915AN+MT7975AN) +(MT7915AN+MT7975GN)

AX3600 Power Topology

MT7622E + (MT7915A+MT7975A)+ (MT7915A+MT7975G), 2/5G_iPA




MT7915AN+MT7975AN 5G 4x4 11ax iPA mode 6.8W @PCIe 3.3V (minicard)
5G OFDM-6M, 21dBm, Duty:96.5%
MT7915AN+MT7975GN 2G 4x4 11ax iPA mode 7W @PCIe 3.3V (minicard)
2G CCK1-1M, 23dBm, Duty:96.5%
MT7915AN+MT7975GN 2G 4x4 11ax iPA mode 6.27W @PCIe 3.3V (minicard)
2G OFDM-6M, 21dBm, Duty:96.5%
MT7915AN+MT7975N MiniCard
MT7622E Worse case @die power 3.2W
MT6380 1.3W
MT7531 5p Giga SW 1.9W

MT7622E+ (MT7915A+MT7975A)+(MT7915A+MT7975G) Power consumption (AX3600, iPA)

Power Adapter @12V	MT7622E +MT7915A+MT7975G (G, 4SS) +MT7915A+MT7975A (A, 4SS) 2G iPA, 5G iPA	MT7622E +MT7915A+MT7975G (G, 4SS) +MT7915A+MT7975A (A, 4SS) 2G iPA, 5G iPA	MT7622E +MT7915A+MT7975G (G, 4SS) +MT7915A+MT7975A (A, 4SS) 2G iPA, 5G iPA
Operation Mode			
Mode	Peak T-put G: HE 40MCS11, 4SS A: HE 80MCS11, 4SS	Low rate (worse case) G: OFDM 6M, 4SS A: OFDM 6M, 4SS	Low rate (worse case) G: CCK-1M, 4SS A: OFDM-6M, 4SS
EPHY	5P	5P	5P
Tx Power	G: 16.5dBm A: 16dBm	G: 21dBm A: 21dBm	G: 23dBm A: 21dBm
CPU	1.35G (2 core)	1.35G (2 core)	1.35G (2 core)
DRAM Clock	1600MHz	1600MHz	1600MHz
Uplink (RX) /T-put	10.8W	9W	9W
	1400Mbps	9.16Mbps	5.3Mbps
Downlink (TX) /T-put	14.76W	19.2W	20.4W
	1400Mbps	9.06Mbps	5.3Mbps
STA associated	7.2W	7.2W	7.2W
STA un-associated	7.08W	7.08W	7.08W
Radio off	4.8W	4.8W	4.8W

unit: W

Uplink	Chariot RX (link at 1000M *1 or 5 ports)
Downlink	Chariot TX (link at 1000M *1 or 5 ports)
STA -Asso	STA Asso w/o traffic (4 ports floating)
Un-Asso	No STA Asso (4 ports floating)
Radio OFF	Radio Off (4 ports floating): shut down RF

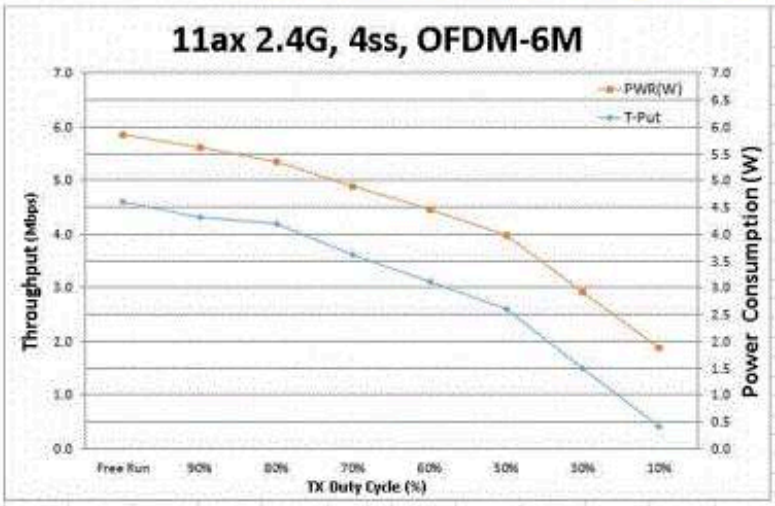
MT7622E+ (MT7915A+MT7975A)+(MT7915A+MT7975G) Power consumption (AX3600, ePA)

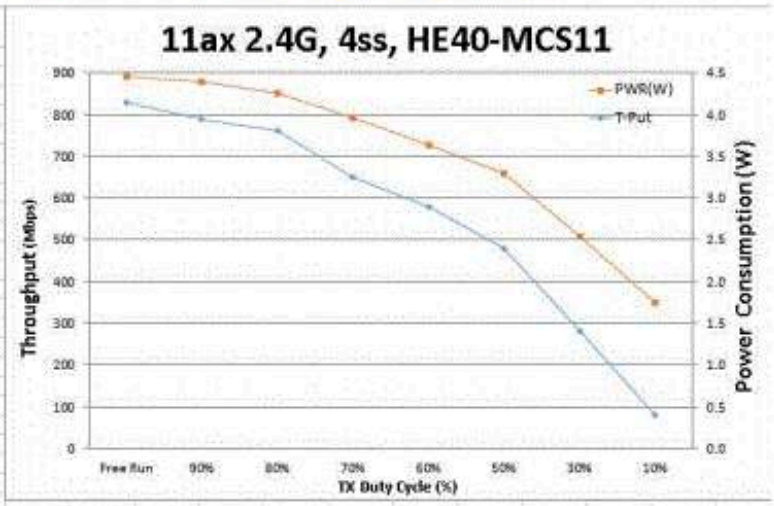
Power Adapter @12V High Power FEM 2G: SKY85331-11 5G: SKY85743-21	MT7622E +MT7915A+MT7975G (G, 4SS) +MT7915A+MT7975A (A, 4SS) 2G ePA, 5G ePA	MT7622E +MT7915A+MT7975G (G, 4SS) +MT7915A+MT7975A (A, 4SS) 2G ePA, 5G ePA	MT7622E +MT7915A+MT7975G (G, 4SS) +MT7915A+MT7975A (A, 4SS) 2G ePA, 5G ePA
Operation Mode			
Mode	Peak T-put G: HE 40MCS11, 4SS A: HE 80MCS11, 4SS	Low rate (worse case) G: OFDM 6M, 4SS A: OFDM 6M, 4SS	Low rate (worse case) G: CCK-1M, 4SS A: OFDM-6M, 4SS
EPHY	5P	5P	5P
Tx Power	G: 20.5dBm A: 18dBm	G: 26.5dBm A: 24.5dBm	G: 26.5dBm A: 24.5dBm
CPU	1.35G (2 core)	1.35G (2 core)	1.35G (2 core)
DRAM Clock	1600MHz	1600MHz	1600MHz
Uplink (RX) /T-put	16.08W	9.48W	9W
	1500Mbps	9.16Mbps	5.3Mbps
Downlink (TX) /T-put	18.12W	29.64W	29.16W
	1500Mbps	9.06Mbps	5.3Mbps
STA associated	7.72W	7.72W	7.72W
STA un-associated	7.7W	7.7W	7.7W
Radio off	4.8W	4.8W	4.8W

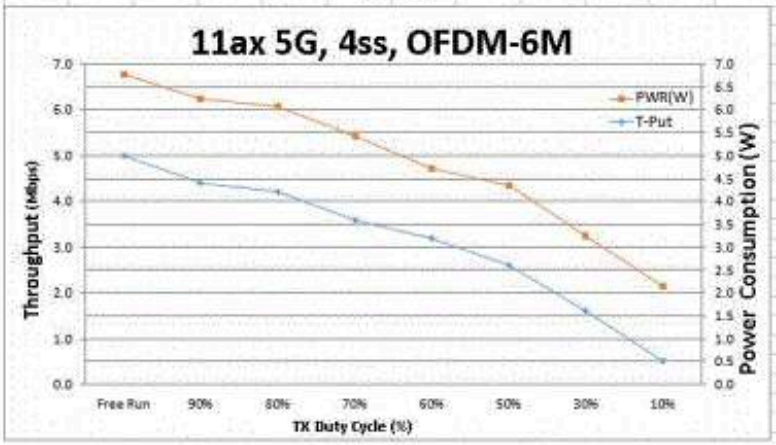
unit: W

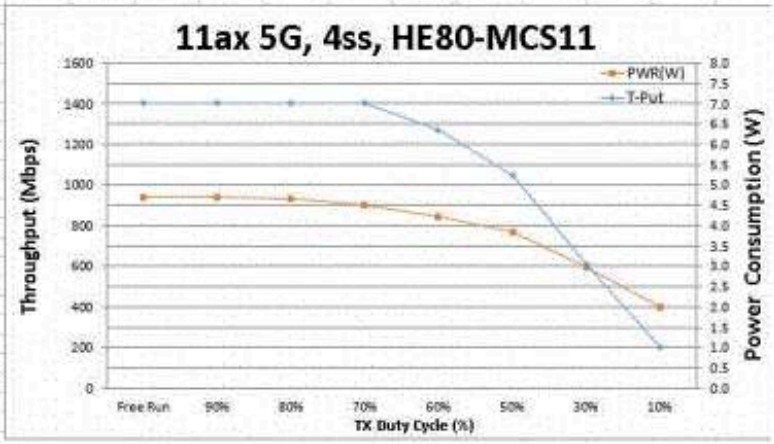
Uplink	Chariot RX (link at 1000M *1 or 5 ports)
Downlink	Chariot TX (link at 1000M *1 or 5 ports)
STA -Asso	STA Asso w/o traffic (4 ports floating)
Un-Asso	No STA Asso (4 ports floating)
Radio OFF	Radio Off (4 ports floating): shut down RF

Power vs T-put vs TX duty cycle









PS: All power data are measured at mini-card @3.3V