	Circuit	Freq (GHz)	Notes
Dilmaghanian	passive vector modulator	8--12	I/Q mismatch < 5 degrees, Attn. range -20~-1 dB
Adili	6-bit attenuator	8--12	Attn step 0.25 dB, RMS gain error 0.25 dB
Mohammadi	6-bit phase shifter (180/90/45 bits)	8--12	RMS phase error < 3 degrees
Naghavi	6-bit phase shifter (22.5/11.25/5.625 bits)	8--12	RMS phase error < 3 degrees
Hoseini	passive vector modulator	12--18	I/Q mismatch < 5 degrees, Attn. range -20~-1 dB
Lotfi	6-bit phase shifter (180/90/45 bits)	12--18	RMS phase error < 3 degrees
Piri	6-bit phase shifter (22.5/11.25/5.625 bits)	12--18	RMS phase error < 3 degrees
Ahmadi Kia	VCO	5	20% tuning range, 10 mA bias current, min phase noise

Note:

1) match all input/output ports to 50 ohms (return loss > 12 dB)
2) all control voltages should be 0 or 5 V

Report should include:

1) Design procedure
2) Schematic with element values reported in a table
3) schematic simulation results
4) Layout
5) Comparsion of schematic and layout simulations