

**REPLACEMENT PART REFERENCE GUIDE, MNA-5+**

**AN-60-088**

ORIGINAL PART:

MNA-5+

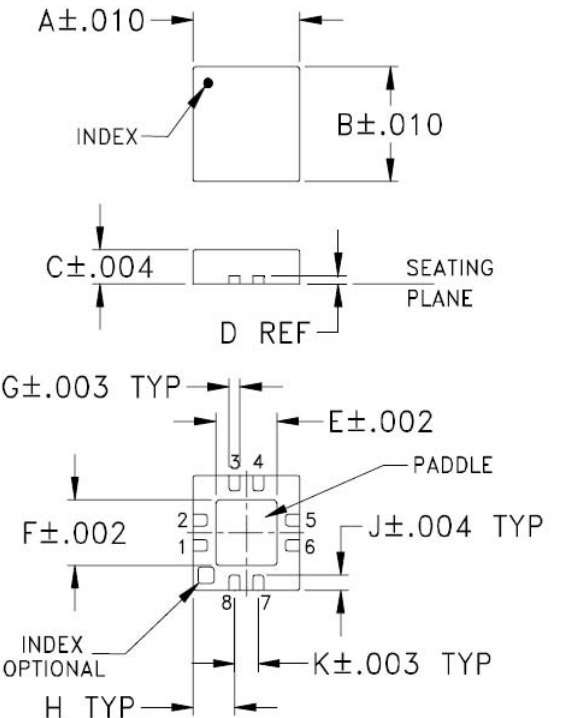
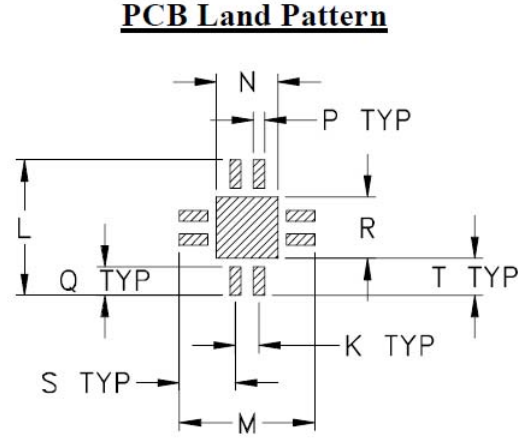
REPLACEMENT PART:

MNA-5A+



*Replacement Part has been judged by Mini-Circuits Engineering as a suitable replacement to Original Part.*

**MECHANICAL DIMENSIONS & PCB LAND PATTERN**

ORIGINAL PART: MNA-5+	REPLACEMENT PART: MNA-5A+
<p><b>Case Style DQ849 (No Change)</b></p> <div style="display: flex; justify-content: space-around;"> <div style="width: 45%;">  </div> <div style="width: 45%;"> <p style="text-align: center;"><b>PCB Land Pattern</b></p>  <p style="text-align: center;">Suggested Layout, Tolerance to be within ±.002</p> </div> </div>	
<p>Marking</p> <p>MNA5</p>	<p>Marking</p> <p>MN5A</p>

## CONCLUSION:

### 1) FORM-FIT-FUNCTIONAL COMPATIBLE<sub>a</sub>:

Replacement part is Form, Fit compatible. Following is a summary of changes/improvements:

Typical performance: See paragraphs 2 and 3

Min/Max Specifications, Thermal Resistance and Max Tj- see below:

Parameter	Original Part (MNA-5+)	Replacement Part (MNA-5A+)
Gain at 2 GHz	17dB min	19.1 dB min
DC Current at Vs=5V (max)	40 mA max.	43 mA max
Thermal Resistance	78°C/W	64.1°C/W
DC Voltage on pins 2 &5	10V max	1V max
Power Dissipation	500 mW max	700 mW max

2) PERFORMANCE COMPARISON<sub>a</sub> (TYPICAL), DC Voltage=5V:

Parameter	Freq. (MHz)	MNA-5+ (Original Part) Qty-1			MNA-5A+ (Replacement Part) 10 units on TB		
		Min	Avg.	Max	Min	Avg.	Max
Gain (dB)	500	17.6	17.6	17.6	21.6	21.7	21.9
	750	20.3	20.3	20.3	23.3	23.4	23.5
	1000	21.2	21.2	21.2	23.5	23.6	23.7
	1500	21.5	21.5	21.5	22.8	23.1	23.3
	2000	20.6	20.6	20.6	21.3	21.8	22.0
	2500	18.4	18.4	18.4	19.2	19.9	20.1
Input R.Loss (dB)	500	8.5	8.5	8.5	5.4	5.4	5.6
	750	12.0	12.0	12.0	10.4	10.5	10.9
	1000	12.2	12.2	12.2	14.9	15.3	16.2
	1500	11.8	11.8	11.8	21.4	22.6	25.0
	2000	18.6	18.6	18.6	21.6	22.6	24.5
	2500	16.5	16.5	16.5	17.1	18.0	18.8
Output R.Loss (dB)	500	9.3	9.3	9.3	14.5	14.7	15.4
	750	11.1	11.1	11.1	15.4	17.5	18.6
	1000	10.5	10.5	10.5	12.8	14.1	14.7
	1500	9.5	9.5	9.5	11.6	12.4	13.2
	2000	9.5	9.5	9.5	12.2	12.7	13.5
	2500	11.3	11.3	11.3	12.8	13.3	13.9
P1dB (dBm)	500	11.6	11.6	11.6	12.6	13.7	14.1
	750	12.2	12.2	12.2	12.1	13.1	13.5
	1000	11.3	11.3	11.3	11.1	12.2	12.5
	1500	10.0	10.0	10.0	10.4	11.5	11.9
	2000	9.2	9.2	9.2	9.6	10.6	11.0
	2500	9.3	9.3	9.3	8.7	9.9	10.3
Output IP3, Min of USB & LSB (dBm)	500	23.0	23.0	23.0	23.8	25.0	25.5
	750	23.6	23.6	23.6	23.8	25.0	25.4
	1000	22.2	22.2	22.2	22.3	23.5	23.8
	1500	21.0	21.0	21.0	21.3	22.5	22.9
	2000	20.1	20.1	20.1	20.1	21.3	21.8
	2500	20.3	20.3	20.3	19.1	20.4	21.0
NF (dB)	500	3.8	3.8	3.8	3.1	3.1	3.2
	750	3.6	3.6	3.6	2.9	3.1	3.3
	1000	3.5	3.5	3.5	2.9	2.9	3.0
	1500	3.6	3.6	3.6	2.9	3.0	3.0
	2000	3.8	3.8	3.8	3.0	3.0	3.1
	2500	4.1	4.1	4.1	3.0	3.1	3.2
Directivity (dB)	500	20.3	20.3	20.3	20.3	20.7	20.9
	750	20.8	20.8	20.8	20.9	21.1	21.3
	1000	19.8	19.8	19.8	19.7	19.9	20.0
	1500	18.0	18.0	18.0	17.4	17.6	17.9
	2000	17.8	17.8	17.8	16.6	17.0	17.4
	2500	19.2	19.2	19.2	17.3	17.7	18.2
DC Current (mA)	DC	32.1	32	32	30	34	35

### 3) PERFORMANCE COMPARISON<sub>a</sub> (TYPICAL), DC Voltage=2.8V:

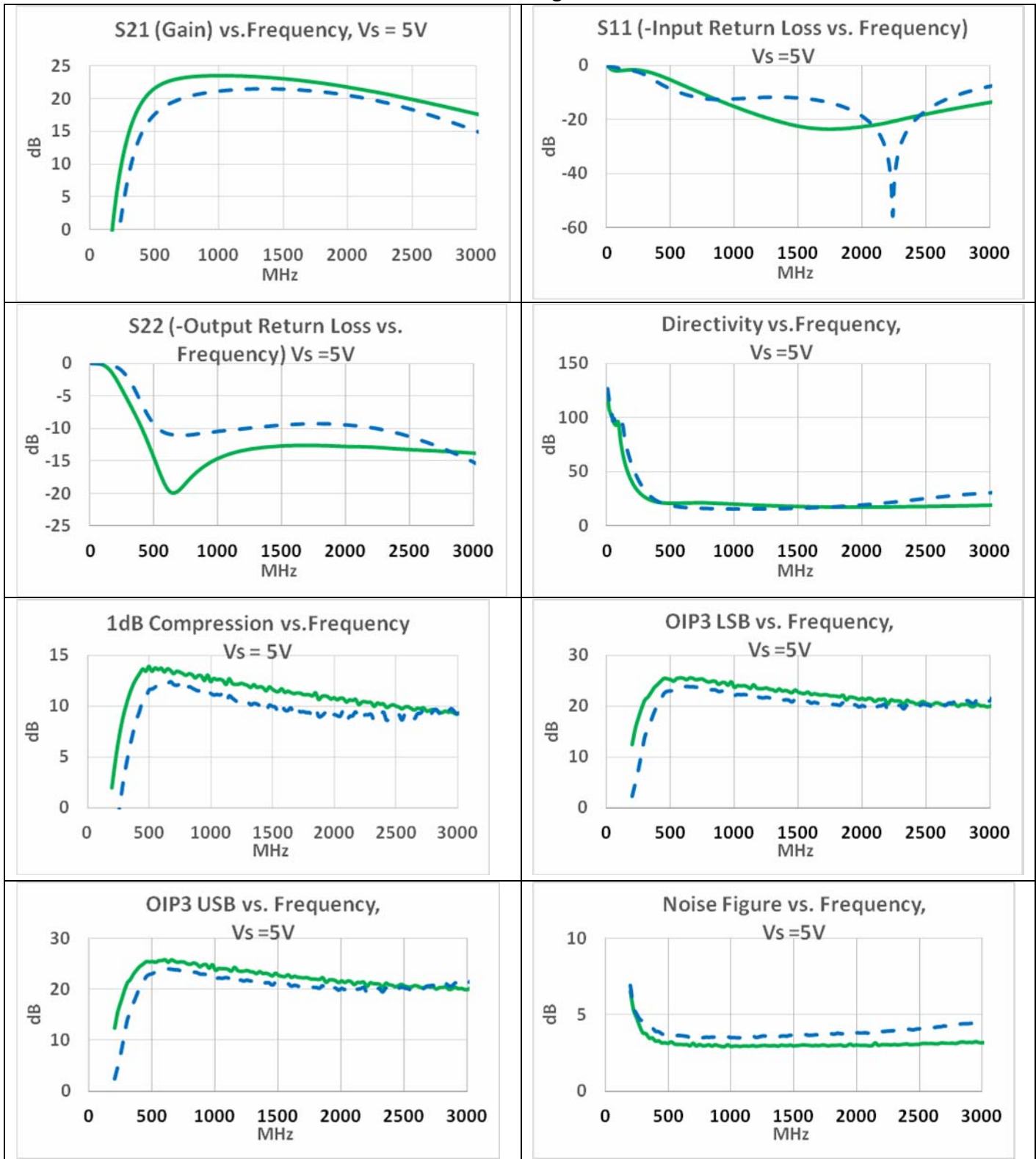
Parameter	Freq. (MHz)	MNA-5+ (Original Part) Qty-1			MNA-5A+ (Replacement Part) 10 units on TB Qty-5		
		Min	Avg.	Max	Min	Avg.	Max
Gain (dB)	500	16.8	16.8	16.8	20.5	20.7	20.8
	750	19.3	19.3	19.3	21.9	22.0	22.1
	1000	20.0	20.0	20.0	21.9	22.0	22.1
	1500	20.2	20.2	20.2	21.0	21.2	21.3
	2000	19.4	19.4	19.4	19.4	19.7	19.9
	2500	17.4	17.4	17.4	17.4	17.9	18.1
Input R.Loss (dB)	500	8.2	8.2	8.2	5.6	5.7	5.8
	750	11.7	11.7	11.7	10.8	10.9	11.2
	1000	12.0	12.0	12.0	15.3	15.6	16.4
	1500	11.8	11.8	11.8	20.8	21.7	22.8
	2000	18.1	18.1	18.1	21.1	21.7	23.0
	2500	16.9	16.9	16.9	17.2	17.9	18.5
Output R.Loss (dB)	500	8.8	8.8	8.8	14.4	15.0	16.6
	750	9.7	9.7	9.7	23.1	36.2	48.0
	1000	9.1	9.1	9.1	17.4	20.3	22.2
	1500	8.1	8.1	8.1	15.3	16.7	18.2
	2000	7.6	7.6	7.6	15.3	16.4	17.4
	2500	8.2	8.2	8.2	15.7	17.0	18.0
P1dB (dBm)	500	9.7	9.7	9.7	11.0	11.4	11.5
	750	10.0	10.0	10.0	10.8	11.4	11.6
	1000	9.2	9.2	9.2	10.1	10.9	11.1
	1500	8.0	8.0	8.0	9.4	10.2	10.4
	2000	7.1	7.1	7.1	8.4	9.3	9.6
	2500	7.2	7.2	7.2	7.5	8.5	8.8
Output IP3, Min of USB & LSB, (dBm)	500	21.3	21.3	21.3	21.8	22.5	22.7
	750	21.6	21.6	21.6	21.7	22.4	22.7
	1000	20.3	20.3	20.3	20.6	21.4	21.7
	1500	19.3	19.3	19.3	19.6	20.5	20.8
	2000	18.4	18.4	18.4	18.5	19.5	19.9
	2500	18.4	18.4	18.4	17.5	18.6	19.0
NF (dB)	500	3.8	3.8	3.8	3.1	3.2	3.3
	750	3.6	3.6	3.6	3.0	3.1	3.2
	1000	3.5	3.5	3.5	2.9	3.0	3.0
	1500	3.7	3.7	3.7	3.0	3.0	3.1
	2000	3.9	3.9	3.9	3.1	3.1	3.2
	2500	4.1	4.1	4.1	3.2	3.2	3.2
Directivity (dB)	500	22.1	22.1	22.1	22.5	22.8	23.1
	750	21.3	21.3	21.3	21.5	21.7	21.9
	1000	19.3	19.3	19.3	19.3	19.5	19.6
	1500	17.3	17.3	17.3	16.9	17.1	17.3
	2000	17.0	17.0	17.0	16.2	16.4	16.7
	2500	17.8	17.8	17.8	16.6	16.9	17.3
DC Current (mA)	DC	29.5	30	30	28	32	33

## 4) PERFORMANCE COMPARISON CURVES<sub>a</sub> (TYPICAL), DC Supply=5V:



Data of Replacement Part

Data of Original Part



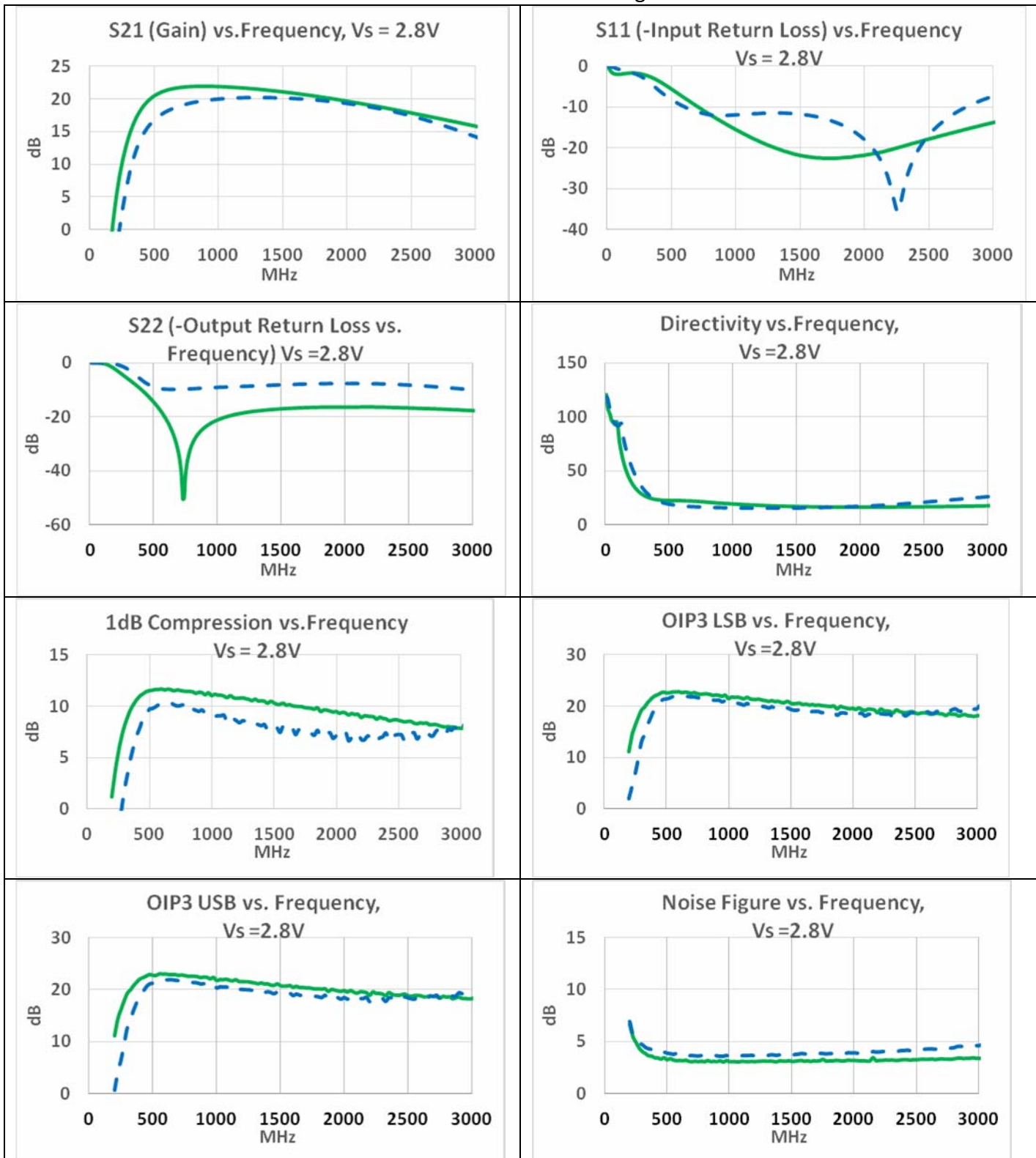
## 5) PERFORMANCE COMPARISON CURVES<sub>a</sub> (TYPICAL), DC

Supply=2.8V:



Data of Replacement Part

Data of Original Part



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