

The RF Line
NPN Silicon
High-Frequency Transistor

- Tape and reel packaging options available for MRF3866R2:
R2 suffix = 2,500 units per reel

MPS3866
MRF3866R2

$I_C = 400$ mA
HIGH-FREQUENCY
TRANSISTORS
NPN SILICON

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CE0}	30	Vdc
Collector-Base Voltage	V_{CB0}	55	Vdc
Emitter-Base Voltage	V_{EB0}	3.5	Vdc
Collector Current — Continuous	I_C	0.4	Adc
Total Device Dissipation @ $T_A = 25$ C Derate above 25 C	P_D	625 5.0	mW mW/ C
Total Device Dissipation @ $T_C = 25$ C Derate above 25 C	P_D	1.5 12	Watts mW/ C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-55 to +150	C
Maximum Junction Temperature	T_{Jmax}	150	C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	C/W
Thermal Resistance, Junction to Ambient MPS3866 MRF3866R2	$R_{\theta JA}$	200 125	C/W

CASE 29-04, STYLE 1
TO-226AA
MPS3866 (TO-92)



CASE 751-05, STYLE 1
MRF3866R2 (SO-8)

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage ($I_C = 5.0$ mAdc, $R_{BE} = 10$ Ω)	$V_{(BR)CER}$	55	—	Vdc
Collector-Emitter Sustaining Voltage ($I_C = 5.0$ mAdc, $I_B = 0$)	$V_{CE0(sus)}$	30	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 100$ μ Adc, $I_C = 0$)	$V_{(BR)EBO}$	3.5	—	Vdc
Collector Cutoff Current ($V_{CE} = 28$ Vdc, $I_B = 0$)	I_{CE0}	—	0.02	mAdc
Collector Cutoff Current ($V_{CE} = 30$ Vdc, $V_{BE} = -1.5$ Vdc (Rev.), $T_C = 150$ C) ($V_{CE} = 55$ Vdc, $V_{BE} = -1.5$ Vdc (Rev.))	I_{CEX}	—	5.0 0.1	mAdc
Emitter Cutoff Current ($V_{BE} = 3.5$ Vdc, $I_C = 0$)	I_{EBO}	—	0.1	mAdc

(continued)

REV 7

ELECTRICAL CHARACTERISTICS — continued ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
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ON CHARACTERISTICS

DC Current Gain ($I_C = 360\text{ mAdc}$, $V_{CE} = 5.0\text{ Vdc}$) (1) ($I_C = 50\text{ mAdc}$, $V_{CE} = 5.0\text{ Vdc}$)	h_{FE}	5.0 10	— 200	—
Collector–Emitter Saturation Voltage ($I_C = 100\text{ mAdc}$, $I_B = 20\text{ mAdc}$)	$V_{CE(sat)}$	—	1.0	Vdc

SMALL–SIGNAL CHARACTERISTICS

Current–Gain — Bandwidth Product ($I_C = 50\text{ mAdc}$, $V_{CE} = 15\text{ Vdc}$, $f = 200\text{ MHz}$)	f_T	500	—	MHz
Output Capacitance ($V_{CB} = 28\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{obo}	—	3.0	pF

FUNCTIONAL TEST

Amplifier Power Gain ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 1.0\text{ W}$, $f = 400\text{ MHz}$)	MPS3866	G_{pe}	10	—	dB
Collector Efficiency ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 1.0\text{ W}$, $f = 400\text{ MHz}$)	MPS3866	η	45	—	%

NOTE:

1. Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

V_{CE} (Volts)	I_C (mA)	f (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
			S_{11}	$\angle \phi$	S_{21}	$\angle \phi$	S_{12}	$\angle \phi$	S_{22}	$\angle \phi$
15	50	100	0.67	-166	13.75	92	0.016	44	0.32	-27
		200	0.69	-176	6.93	81	0.024	53	0.30	-24
		300	0.70	177	4.57	73	0.032	57	0.32	-31
		400	0.71	172	3.38	67	0.042	59	0.34	-37
		500	0.72	168	2.66	61	0.049	59	0.37	-45
		600	0.72	164	2.17	54	0.056	61	0.40	-53
		700	0.72	160	1.85	49	0.061	63	0.43	-60
		800	0.72	155	1.61	44	0.068	65	0.47	-66
		900	0.71	151	1.40	39	0.075	64	0.50	-73
		1000	0.70	146	1.25	34	0.084	68	0.53	-79

Table 1. MRF3866R2 Common Emitter S-Parameters