



Fixed Resistors Thin Film Applications

Power Film

Wire Wound

Shunt

Precision

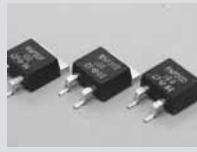
Microwave

Thermal Converter



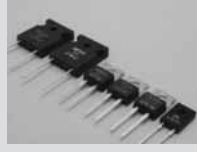
RNP Series (SMD)					TO-style Power Film Resistors				
Type	Style	Power (Watts)	Res. Range (ohms)	TCR (ppm/K)	Tol. (%)	W (mm)	H (mm)	L (mm)	P (mm)
RNP-20D	TO263	35	0.02-51K	*1	1%, 5%	10.1	10.3	4.5	5.08
RNP-20E	TO263	35	0.02-51K	*1	1%, 5%	10.1	10.3	4.5	5.08
RNP-20F	TO263	35	0.02-51K	*1	1%, 5%	10.1	10.3	4.5	5.08
RNC-50	---	50	0.02-51K	*1	5%	8.2	12.0	0.8	5.08

*1 Resistance 0.02-0.099: >250ppm/C, 0.1-9.9: 100ppm/C, 10-51K: 50ppm/C




RNP Series					TO-style Power Film Resistors				
Type	Style	Power (Watts)	Res. Range (ohms)	TCR (ppm/K)	Tol. (%)	W (mm)	H (mm)	L (mm)	P (mm)
RNP-10S	TO126	20	0.02-51K	*1	1%, 5%	8.5	12.0	3.1	5.08
RNP-10	TO220	20	0.02-51K	*1	1%, 5%	10.1	15.0	4.5	5.08
RNP-20S	TO220	35	0.02-51K	*1	1%, 5%	10.1	15.0	4.5	5.08
RNP-50U	TO220	50	0.02-51K	*1	1%, 5%	10.1	15.0	4.5	5.08
RNP-50S	TO247	100	0.02-51K	*1	1%, 5%	16.0	20.0	4.8	10.9
RNP-80S	TO247	100	0.02-51K	*1	1%, 5%	16.0	20.0	4.8	10.9
RNP-100S	TO247	140	0.02-51K	*1	1%, 5%	16.0	20.0	4.8	10.9
RNP-140S	TO247	140	0.02-51K	*1	1%, 5%	16.0	20.0	4.8	10.9

*1 Resistance 0.02-0.099: >250ppm/C, 0.1-9.9: 100ppm/C, 10-51K: 50ppm/C




RPM Series					SOT-style Power Film Resistors				
Type	Style	Power (Watts)	Res. Range (ohms)	TCR (ppm/K)	Tol. (%)	W (mm)	H (mm)	L (mm)	P (mm)
RPM150	SOT227	150	0.1-1K	*1	5%	38.0	11.8	25.0	13.0
RPM200	SOT227	200	0.1-1K	*1	5%	38.0	11.8	25.0	13.0
RPM250	SOT227	250	0.1-1K	*1	5%	38.0	11.8	25.0	13.0
RPM300	SOT227	300	0.1-1K	*1	5%	38.0	11.8	25.0	13.0
RPM550	SOT227	550	50-1K	*1	5%	38.0	11.8	25.0	13.0
RPM600	SOT227	600	50-1K	*1	5%	38.0	11.8	25.0	13.0
RPK600	SOT227	600	50-1K	*1	5%	38.0	11.8	25.0	13.0
RPK900	SOT227	900	50-1K	*1	5%	38.0	11.8	25.0	13.0

*1 Resistance 0.02-0.099: >250ppm/C, 0.1-100K: 100ppm/C

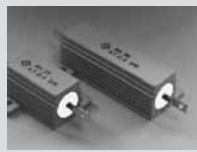


RPF, RPH Series					Screw Mount, Water Cooling, Power Film Resistors				
Type	Style	Power (Watts)	Res. Range (ohms)	TCR (ppm/K)	Tol. (%)	W (mm)	H (mm)	L (mm)	P (mm)
RPF50	Screw M	50	10-1K	50	1%, 5%	44.0	5.0	30.0	wire
RPF100	Screw M	100	10-1K	50	1%, 5%	50.0	10.0	50.0	wire
RPF250	Screw M	250	10-1K	50	1%, 5%	100.0	10.0	50.0	wire
RPH500	Water C	500	10-1K	50	1%, 5%	70.0	15.0	30.0	wire
RPH500S	Water C	500	0.22-1K	250	1%, 5%	102	81	70	---
RPH1000S	Water C	1000	0.22-1K	250	1%, 5%	204	81	70	---
RPH2000S	Water C	2000	0.22-1K	250	1%, 5%	204	---	70	---



RH, IRS Series					Metal Clad Wire Wound Resistors				
Type	Style	Power (Watts)	Res. Range (ohms)	TCR (ppm/K)	Tol. (%)	W (mm)	H (mm)	L (mm)	P (mm)
RH25C	Metal C	20	0.022-25K	250	5% *1	27.1	16.0	15.6	---
RH25CN	Metal C	20	0.1-10K	250	5% *1	27.1	16.0	15.6	---
RH50C	Metal C	30	0.05-50K	250	5% *1	49.3	16.0	15.6	---
RH50CN	Metal C	30	1.0-20K	250	5% *1	49.3	16.0	15.6	---
IRS30	Low P	30	1.0-420	260	5% *1	65.0	6.5	42.5	wire
IRS50	Low P	50	1.0-500	260	5% *1	90.0	6.5	42.5	wire


*1 Tolerance: 0.1%, 0.5%, 1.0%, 5.0% are optionally available



Wirewound

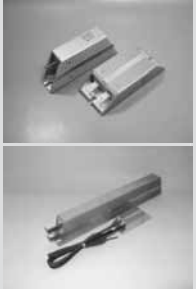
IRN, IRF Series				Flat Metal Clad Wire Wound Resistors					
Type	Style	Power (Watts)	Res. Range (ohms)	TCR (ppm/K)	Tol. (%)	W (mm)	H (mm)	L (mm)	P (mm)
IRN50	Metal C	50	1.0-0.42K	260	5.0 *2	60	10	70	wire
IRN100	Metal C	100	1.0-1.1K	260	5.0 *2	60	10	120	wire
IRN150	Metal C	150	1.0-1.75K	260	5.0 *2	60	10	170	wire
IRF100	Metal C	100	1.0-1.1K	260	5.0 *2	80	10	90	wire
IRF150	Metal C	150	1.0-1.75K	260	5.0 *2	80	10	120	wire
IRF200	Metal C	200	1.0-2.2K	260	5.0 *2	80	10	150	wire
IRF250	Metal C	250	1.0-2.97K	260	5.0 *2	80	10	180	wire
IRF300	Metal C	300	1.0-3.50K	260	5.0 *2	80	10	210	wire
IRF400	Metal C	400	1.0-4.45K	260	5.0 *2	80	10	270	wire
IRF500	Metal C	500	1.0-5.78K	260	5.0 *2	80	10	330	wire

*2 0.5, 1.0, 2.0 % are available




IRV, IRH Series				Metal Clad Wire Wound Resistors					
Type *1	Style	Power (Watts)	Res. Range (ohms)	TCR (ppm/K)	Tol. (%)	W (mm)	H (mm)	L (mm)	P *3 (mm)
IRV60	Metal C	60	0.1 - 270	260	5% *2	22	41	100	W & T
IRV80	Metal C	80	0.1 - 910	260	5% *2	22	41	150	W & T
IRV100	Metal C	100	0.1 - 1.1K	260	5% *2	22	41	165	W & T
IRV120	Metal C	120	0.1 - 1.3K	260	5% *2	22	41	182	W & T
IRV150	Metal C	150	0.1 - 1.6K	260	5% *2	22	41	210	W & T
IRV200	Metal C	200	0.1 - 2.2K	260	5% *2	30	60	165	W & T
IRV300	Metal C	300	0.1 - 2.7K	260	5% *2	30	60	215	W & T
IRV400	Metal C	400	0.1 - 4.3K	260	5% *2	30	60	265	W & T
IRV500	Metal C	500	0.1 - 6.8K	260	5% *2	30	60	335	W & T
IRH60	Metal C	60	0.1 - 270	260	5% *2	41	22	100	W & T
IRH80	Metal C	80	0.1 - 910	260	5% *2	41	22	150	W & T
IRH100	Metal C	100	0.1 - 1.1K	260	5% *2	41	22	165	W & T
IRH120	Metal C	120	0.1 - 1.3K	260	5% *2	41	22	182	W & T
IRH150	Metal C	150	0.1 - 1.6K	260	5% *2	41	22	210	W & T
IRH200	Metal C	200	0.1 - 2.2K	260	5% *2	60	30	165	W & T
IRH300	Metal C	300	0.1 - 2.7K	260	5% *2	60	30	215	W & T
IRH400	Metal C	400	0.1 - 4.3K	260	5% *2	60	30	265	W & T
IRH500	Metal C	500	0.1 - 6.8K	260	5% *2	60	30	335	W & T

*1 no-inductive is available add "N". *2 Tolerance 0.5, 1.0, 2.0, are available. *3 "W & T": wires and metal tabs




IRV, ULV Series				Metal Clad Wire Wound Resistors					
Type	Style	Power (Watts)	Res. Range (ohms)	TCR (ppm/K)	Tol. (%)	W (mm)	H (mm)	L (mm)	P *2 (mm)
IRV600	Metal C	600	0.1- 94.0	260	5% *1	61	59	235	W & T
IRV800	Metal C	800	0.1-112.0	260	5% *1	61	59	285	W & T
IRV1000	Metal C	1000	0.1-140.0	260	5% *1	61	59	335	W & T
IRV1200	Metal C	1200	0.1-160.0	260	5% *1	61	59	405	W & T
ULV600	UL & MC	600	0.1- 94.0	260	5% *1	61	59	235	W & T
ULV800	UL & MC	800	0.1-112.0	260	5% *1	61	59	285	W & T
ULV1000	UL & MC	1000	0.1-140.0	260	5% *1	61	59	335	W & T
ULV1200	UL 6 MC	1200	0.1-160.0	260	5% *1	61	59	405	W & T

*1 0.5, 1.0, 2.0 % are available. *2 "W & T" shows wires and metal tabs




WSL Series				Metal Plate Shunt Resistors					
Type	Style	Power (Watts)	Res. Range (mohms)	TCR (ppm/K)	Tol. (%)	L (mm)	W (mm)	H (mm)	P (mm)
WSL1	CHIP	1.0	0.5-5	100	1, 5	5.08	2.54 *1	2.0	---
WSL2	CHIP	2.0	0.5-5	100	1, 5	6.40	3.20 *1	2.0	---
WSL8	CHIP	8.0	0.5-5	100	1, 5,	12.8	6.40 *1	2.5	---


*1 Dimension W happen to be changed by it's resistance




RAH10V, RAF30, NSPC Series					Metal Plate Shunt Resistors				
Type	Style	Power (Watts)	Res. Range (mohms)	TCR (ppm/K)	Tol. (%)	W (mm)	H (mm)	L (mm)	P (mm)
RAH10V	Radial	10	0.5-10	50	1, 5	22.0	18.5	4.5	17.80
RAF30	Bus	30	0.5-10	50	1, 5	50.0	39.0	2.7	---
NSPB	Screw	10	0.5-5	50	1, 5,	38.0	5.0	25.0	15.0
NSPC	Screw	10	0.5-5	50	1, 5	38.0	5.0	25.0	15.0



RCS Series					Metal Plate Shunt Resistors				
Type	Style	Power (Watts)	Res. Range (mohms)	TCR (ppm/K)	Tol. (%)	W (mm)	H (mm)	L (mm)	P (mm)
RCS2	Bus	2.0	0.1-10	50	1, 5	50.0	12.0	2.0	---
RCS3	Bus	3.0	0.1-10	50	1, 5	55.0	15.0	2.0	---
RCS4	Bus	4.0	0.1-10	50	1, 5,	50.0	15.5	1.5	---




NSLA, NSLB, NSLC Series					Metal Plate Shunt Resistors				
Type	Style	Current (A)	Output Volt (mV)	TCR (ppm/K)	Tol. (%)	W (mm)	H (mm)	L (mm)	P (mm)
NSLA10	Screw	10	50, 60	5	0.25	50.8	42.9	31.8	25.4
NSLA15	Screw	15	50, 60	5	0.25	50.8	42.9	31.8	25.4
NSLA20	Screw	20	50, 60	5	0.25	50.8	42.9	31.8	25.4
NSLA30	Screw	30	50, 60	5	0.25	50.8	42.9	31.8	25.4
NSLA50	Screw	50	50, 60	5	0.25	50.8	42.9	31.8	25.4
NSLA75	Screw	75	50, 60	5	0.25	50.8	42.9	31.8	25.4
NSLA80	Screw	80	50, 60	5	0.25	50.8	42.9	31.8	25.4
NSLA85	Screw	85	50, 60	5	0.25	50.8	42.9	31.8	25.4
NSLA100	Screw	100	50, 60	5	0.25	50.8	42.9	31.8	25.4
NSLA150	Screw	150	50, 60	5	0.25	50.8	42.9	31.8	25.4
NSLB170	Screw	170	50	5	0.25	82.6	44.5	44.5	38.1
NSLB200	Screw	200	50	5	0.25	82.6	44.5	44.5	38.1
NSLB250	Screw	250	50	5	0.25	82.6	44.5	44.5	38.1
NSLB300	Screw	300	50	5	0.25	82.6	44.5	44.5	38.1
NSLB400	Screw	400	50	5	0.25	82.6	44.5	44.5	38.1
NSLB500	Screw	500	50	5	0.25	82.6	44.5	44.5	38.1
NSLB600	Screw	600	50	5	0.25	82.6	44.5	44.5	38.1
NSLC800	Screw	800	50	5	0.25	114	54.0	63.5	54.9
NSLC1000	Screw	1000	50	5	0.25	114	54.0	63.5	54.9
NSLC1200	Screw	1200	50	5	0.25	114	54.0	63.5	54.9



NSA Series					Metal Plate Shunt Resistors				
Type	Style	Current (A)	Output Volt (mV)	TCR (ppm/K)	Tol. (%)	W (mm)	H (mm)	L (mm)	P (mm)
NSA50	1 screw	50	50, 60 *1	5	0.25	104.78	9.53	15.88	---
NSA100	1 screw	100	50, 60 *1	5	0.25	104.78	9.53	15.88	---
NSA150	1 screw	150	50, 60 *1	5	0.25	104.78	9.53	23.83	---
NSA200	1 screw	200	50, 60 *1	5	0.25	104.78	12.70	20.65	---
NSA250	1 screw	250	50, 60 *1	5	0.25	104.78	12.70	27.00	---
NSA300	1 screw	300	50, 60 *1	5	0.25	104.78	12.70	31.75	---
NSA400	1 screw	400	50, 60 *1	5	0.25	117.48	19.05	25.40	---
NSA500	1 screw	500	50, 60 *1	5	0.25	117.48	19.05	31.75	---
NSA600	1 screw	600	50, 60 *1	5	0.25	117.48	19.05	38.10	---


*1 100mV is available under different dimensions.




Shunt

NSB Series				Metal Plate Shunt Resistors					
Type	Style	Current (A)	Output Volt (mV)	TCR (ppm/K)	Tol. (%)	W (mm)	H (mm)	L (mm)	P (mm)
NSB300	2 screws	300	50, 60 *1	5	0.25	149.23	12.70	44.45	---
NSB400	2 screws	400	50, 60 *1	5	0.25	149.23	19.05	50.80	---
NSB500	2 screws	500	50, 60 *1	5	0.25	149.23	19.05	50.80	---
NSB600	2 screws	600	50, 60 *1	5	0.25	149.23	19.05	50.80	---
NSB700	2 screws	700	50, 60 *1	5	0.25	149.23	19.05	57.15	---
NSB800	2 screws	800	50, 60 *1	5	0.25	149.23	19.05	60.33	---
NSB1000	2 screws	1000	50, 60 *1	5	0.25	149.23	25.40	63.50	---
NSB1200	2 screws	1200	50, 60 *1	5	0.25	149.23	25.40	76.20	---


*1 100mV is available under different dimensions.



NSE Series				Metal Plate Shunt Resistors					
Type	Style	Current (A)	Output Volt (mV)	TCR (ppm/K)	Tol. (%)	W (mm)	H (mm)	L (mm)	P (mm)
NSE1500	4 screws	1500	50, 60	5	0.25	244.45	25.40	76.20	---
NSE1500	4 screws	1500	100	5	0.25	285.75	25.40	76.20	---
NSE2000	4 screws	2000	50, 60	5	0.25	244.45	25.40	76.20	---
NSE2000	4 screws	2000	100	5	0.25	285.75	25.40	76.20	---




NSS Series				Metal Plate Shunt Resistors					
Type	Style	Current (A)	Output Volt (mV)	TCR (ppm/K)	Tol. (%)	W (mm)	H (mm)	L (mm)	P (mm)
NSS100	1 screw	100	50, 60, 100	100	1.0	100	10	30	---
NSS200	1 screw	200	50, 60, 100	100	1.0	100	10	30	---
NSS400	1 screw	400	50, 60, 100	100	1.0	100	10	30	---
NSS600	1 screw	600	50, 60, 100	100	1.0	100	10	50	---
NSS1000	1 screw	1000	50, 60, 100	100	1.0	100	10	70	---




RP-44 Series				Thin Film Precision – Long Life Resistors					
Type	Style	Power (W)	Res. Range (ohms)	TCR *1 (ppm/K)	Tol. *1 (%)	W (mm)	H (mm)	L (mm)	P (mm)
RP-84	Radial	1/8	10-47K	(25) 50	(0.1) 1.0	5.0	5.0	2.5	2.5
RP-44	Radial	1/4	10-250K	(25) 50	(0.1) 1.0	7.5	5.5	2.5	5.0
RP-24	Radial	1/2	10-1M	(25) 50	(0.1) 1.0	10.0	7.5	2.5	7.5
RP-14	Radial	1.0	10-1M	(25) 50	(0.1) 1.0	14.0	8.5	2.5	10.0

*1 25ppm/K TCR and 0.1% tolerance are option. 0.1-10M resistance are available. Tape, color, forming available.




RP-46 Series				Thin Film Precision Resistors					
Type	Style	Power (W)	Res. Range (ohms)	TCR (ppm/K)	Tol. (%)	W (mm)	H (mm)	L (mm)	P (mm)
RP48	Radial	1/4	100-150K	2.5	0.02	5.6	8.2	2.54	2.54
RP47	Radial	1/4	100-150K	2.5	0.02	6.8	8.6	2.54	3.18
RP46	Radial	1/4	100-150K	2.5	0.02	8.0	9.0	2.54	5.08
RP45	Radial	1/4	100-150K	2.5	0.02	10.2	9.0	2.54	7.62


* 25ppm/K TCR and 0.1% tolerance are optional. 0.1-10M resistance are available.




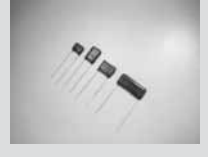
NQA Series				Thin Film Precision Chip Resistors					
Type	Style	Power (W)	Res. Range (ohms)	TCR (ppm/K)	Tol. (%)	L (mm)	W (mm)	H (mm)	P (mm)
NQA18	Chip	0.125	100-33K	5 *1	0.05 *1	3.2	2.5	1.0	---
NQA14	Chip	0.250	100-62K	5 *1	0.05 *1	4.5	3.2	1.0	---


*1 5ppm/K-0.1%, 5ppm/K-0.05% are available.

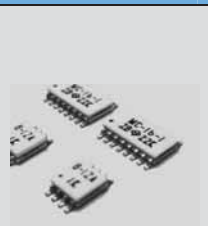


R Series										Thin Film Precision Chip Resistors
Type	Style	Power (W)	Res. Range (ohms)	TCR (ppm/K)	Tol. (%)	L (mm)	W (mm)	H (mm)	P (mm)	
R1206	Chip	0.25	25-50K	5 *1	0.05 *1	3.05	1.53	0.7	---	
R1210	Chip	0.25	25-50K	5 *1	0.05 *1	3.05	2.54	0.7	---	
R2010	Chip	0.5	1-100K	5 *1	0.05 *1	5.08	2.54	0.7	---	
R2512	Chip	1.0	1-100K	5 *1	0.05 *1	6.35	3.05	0.7	---	
R3020	Chip	2.0	1-100K	5 *1	0.05 *1	7.62	5.08	0.7	---	
*1 25ppm/K TCR and 0.1% tolerance are optional. 0.1-10M resistance is optional.										


RPC Series										Thin Film Power Chip Resistors
Type	Style	Power (W)	Res. Range (ohms)	TCR (ppm/K)	Tol. (%)	L (mm)	W (mm)	H (mm)	P (mm)	
RPC14	Chip	0.25	10-200K	50	1.0	3.2	2.6	0.7	---	
RPC12	Chip	0.5	10-200K	50	1.0	5.0	2.5	0.7	---	
RPC11	Chip	1.0	10-1M	50	1.0	5.7	3.8	0.7	---	
RPC21	Chip	2.0	10-1M	50	1.0	8.5	5.5	0.7	---	

RP-42 Series					Thin Film Precision – Long Life Resistors						
Type	Style	Power (W)	Res. Range (ohms)	TCR *1 (ppm/K)	Tol. *1 (%)	W (mm)	H (mm)	L (mm)	P (mm)		
RP-102	Radial	0.125	10-22K	50	1%	5.0	4.05	1.8	3.5		
RP-82	Radial	0.25	10-250K	50	1%	6.3	4.05	2.2	5.0		
RP-41	Radial	0.50	10-510K	50	1%	6.3	9.0	2.2	5.0		
RP-42	Radial	0.50	10-1M	50	1%	9.0	6.3	2.2	7.5		
RP-22	Radial	1.0	10-1M	50	1%	15.0	8.0	2.8	12.5		
RP-23	Radial	1.0	10-1M	50	1%	17.0	6.3	2.8	15.0		
RP-12	Radial	2.0	10-1M	50	1%	22.5	9.0	2.8	20.0		
RP-203	Radial	3.0	10-1M	50	1%	22.5	15.0	3.55	20.0		
RP-303	Radial	4.0	10-1M	50	1%	22.5	15.0	4.25	20.0		
*1 5ppm/K TCR and 0.1% tolerance in available.											


TO126, TO220 Series					Thin Film Precision Power Resistors					
Type	Style	Power (W)	Res. Range (ohms)	TCR (ppm/K)	Tol. (%)	W (mm)	H (mm)	L (mm)	P (mm)	
RPP-10S	TO220	5	5-51K	5	0.1	8.5	12.0	3.1	5.08	
RPP-20S	TO220	10	5-51K	5	0.1	10.1	15.0	4.5	5.08	

MC Series					Thin Film Precision Networks						
Type	Style	Power (W)	Res. Range (ohms)	TCR (ppm/K)	Tol. (%)	W (mm)	L (mm)	H (mm)	P (mm)		
MC4	SOP	0.05	100-22K	5	0.05, 0.1	5.3	3.5	2.3	1.27		
MC8	SOP	0.05	100-22K	5	0.05, 0.1	5.3	5.5	2.3	1.27		
MC16	SOP	0.05	100-22K	5	0.05, 0.1	5.3	10.5	2.3	1.27		
MCL6	SOP	0.10	10K-20K *1	5	1/2 LSB	5.3	11.3	2.3	1.27		
MCL8	SOP	0.10	10K-20K *1	5	1/2 LSB	5.3	11.3	2.3	1.27		
MCL10	SOP	0.10	10K-20K *1	5	1/2 LSB	5.3	13.8	2.3	1.27		
*1 R-2R ladder is available in 1K-2K.											


Precision


MCM Series										Thin Film Precision Networks
Type	Style	Power (W)	Res. Range (ohms)	TCR *1 (ppm/K)	Tol. *1 (%)	W (mm)	L (mm)	H (mm)	P (mm)	
MCM4	SOIC	0.05	100-22K	5-2	0.05-0.02	5.00	3.00	0.8	1.27	
MCM8	SOIC	0.05	100-22K	5-2	0.05-0.02	5.00	5.00	0.8	1.27	
MCM16	SOIC	0.05	100-22K	5-2	0.05-0.02	5.00	10.00	0.8	1.27	


*1 TCR and tolerance show matching and trucking.

2M, 2S, 2T Series										Thin Film Precision Networks
Type	Style	Power (W)	Res. Range (ohms)	TCR (ppm/K)	Tol. (%)	W (mm)	H (mm)	L (mm)	P (mm)	
2M00	SIP	0.125	1K-50K *1	25	0.1	8.0	7.0	2.54	2.54	
2S00	SIP	0.125	1K-50K *1	25	0.1	8.0	5.0	2.54	2.54	
2T00	SIP	0.125	1K-50K *1	5	0.05	8.0	5.0	2.54	2.54	

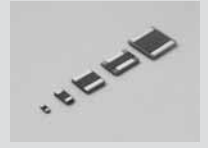
*1 Resistance ratio is limited under 5 times.

MP Series										Thin Film Precision Networks
Type	Style	Power (W)	Res. Range (ohms)	TCR (ppm/K)	Tol. (%)	W (mm)	H (mm)	L (mm)	P (mm)	
MP-3S-2	SIP	0.125	47-22K	5 / 1	0.1 / 0.05	10.2	7.0	3.0	2.54	
MP-4S-2	SIP	0.125	47-22K	5 / 1	0.1 / 0.05	12.7	7.0	3.0	2.54	
MP-5S-2	SIP	0.125	47-22K	5 / 1	0.1 / 0.05	15.2	7.0	3.0	2.54	
MP-6S-2	SIP	0.125	47-22K	5 / 1	0.1 / 0.05	17.8	7.0	3.0	2.54	
MP-4P-2	SIP	0.125	47-22K	5 / 1	0.1 / 0.05	12.7	7.0	3.0	2.54	
MP-5P-2	SIP	0.125	47-22K	5 / 1	0.1 / 0.05	15.2	7.0	3.0	2.54	
MP-6P-2	SIP	0.125	47-22K	5 / 1	0.1 / 0.05	17.8	7.0	3.0	2.54	
MP-7P-2	SIP	0.125	47-22K	5 / 1	0.1 / 0.05	20.3	7.0	3.0	2.54	
MP-8P-2	SIP	0.125	47-22K	5 / 1	0.1 / 0.05	22.9	7.0	3.0	2.54	
MP-2I-2	SIP	0.125	47-22K	5 / 1	0.1 / 0.05	10.2	7.0	3.0	2.54	
MP-3I-2	SIP	0.125	47-22K	5 / 1	0.1 / 0.05	15.2	7.0	3.0	2.54	
MP-4I-2	SIP	0.125	47-22K	5 / 1	0.1 / 0.05	20.3	7.0	3.0	2.54	


MD Series										Thin Film Precision Networks
Type	Style	Power (W)	Res. Range (ohms)	TCR (ppm/K)	Tol. (%)	W (mm)	H (mm)	L (mm)	P (mm)	
MD-8	DIP	0.15	51-10K	25	0.5	22.0	4.6	7.6	2.54	
MD-15	DIP	0.15	51-10K	25	0.5	22.0	4.6	7.6	2.54	

RFH Series										Microwave Resistors
Type	Style	Power (W)	Res. Range (ohms)	TCR (ppm/K)	Tol. (%)	L (mm)	W (mm)	H (mm)	P (mm)	
RFH52	Chip	10	* 1	50	1.0	5.0	2.5	1.2	---	
RFH72	Chip	10	* 1	50	1.0	7.0	2.0	1.2	---	
RFK52	Chip	20	* 1	50	1.0	5.0	2.5	1.2	---	
RFK72	Chip	20	* 1	50	1.0	7.0	2.0	1.2	---	


*1 50, 100, 150, 200, 250, 300, 400, 600, 800 ohms

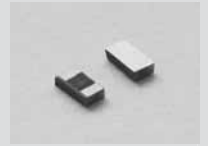
RFR Series										Microwave Chip Resistors
Type	Style	Power (W)	Res. Range (ohms)	TCR (ppm/K)	Tol. (%)	L (mm)	W (mm)	H (mm)	P (mm)	
RFR010 010	Chip	10	*1	50	1.0	5.08	2.54	1.05	---	
RFR010 020	Chip	10	*1	50	1.0	5.08	2.54	1.05	---	
RFR050 010	Chip	50	*1	50	1.0	5.08	5.08	1.05	---	
RFR050 020	Chip	50	*1	50	1.0	5.08	5.08	1.05	---	
RFR100 010	Chip	100	*1	50	1.0	5.84	8.89	1.05	---	
RFR100 020	Chip	100	*1	50	1.0	5.84	8.89	1.05	---	
RFR250 010	Chip	250	*1	50	1.0	9.52	9.52	1.05	---	
RFR250 020	Chip	250	*1	50	1.0	9.52	9.52	1.05	---	

*1 50, 100, 150, 200, 250, 300, 400, 500, 800 ohms


RFR Series										Microwave Flanged Resistors
Type	Style	Power (W)	Res. Range (ohms)	TCR (ppm/K)	Tol. (%)	L (mm)	W (mm)	H (mm)	P (mm)	
RFR010 120	Flange	10	*1	50	1.0	7.10	5.10	3.10	---	
RFR050 120	Flange	50	*1	50	1.0	13.80	6.35	3.10	---	
RFR050 110	Flange	50	*1	50	1.0	20.30	5.70	3.10	---	
RFR100 110	Flange	100	*1	50	1.0	20.30	6.35	3.10	---	
RFR150 110	Flange	150	*1	50	1.0	22.10	9.52	4.00	---	
RFR200 110	Flange	200	*1	50	1.0	24.77	9.52	5.08	---	
RFR250 110	Flange	250	*1	50	1.0	22.10	9.52	4.00	---	
RFR400 110	Flange	400	*1	50	1.0	31.80	12.70	5.33	---	
RFR600 110	Flange	600	*1	50	1.0	48.26	26.42	5.59	---	


*1 50, 100, 150, 200, 250, 300, 400, 500, 800 ohms


RFT Series										Microwave Chip Terminations
Type	Style	Power (W)	Impedance (ohms)	TCR (ppm/K)	Tol. (%)	L (mm)	W (mm)	H (mm)	P (mm)	
RFT010 010	Chip	10	50	50	1.0	5.08	2.54	1.05	---	
RFT010 020	Chip	10	50	50	1.0	5.08	2.54	1.05	---	
RFT050 010	Chip	50	50	50	1.0	5.08	5.08	1.05	---	
RFT050 020	Chip	50	50	50	1.0	5.08	5.08	1.05	---	
RFT100 010	Chip	100	50	50	1.0	5.84	8.89	1.05	---	
RFT100 020	Chip	100	50	50	1.0	5.84	8.89	1.05	---	
RFT150 010	Chip	150	50	50	1.0	6.35	9.52	1.05	---	
RFT150 020	Chip	150	50	50	1.0	6.35	9.52	1.05	---	
RFT250 010	Chip	250	50	50	1.0	9.52	9.52	1.05	---	
RFT250 020	Chip	250	50	50	1.0	9.52	9.52	1.05	---	


RFTS Series										Microwave Chip Terminations	
Type *1	Style	Power (W)	Impedance (ohms)	TCR (ppm/K)	Tol. (%)	L (mm)	W (mm)	H (mm)	P (mm)		
RFTS05	ZF0	Chip	5	50	50	1.0	2.54	1.27	0.63	---	
RFTS05	ZE0	Chip	5	50	50	1.0	2.54	1.27	0.63	---	
RFTS05	ZZ0	Chip	5	50	50	1.0	2.54	1.27	0.63	---	
RFTS05	ZY0	Chip	5	50	50	1.0	2.54	1.27	0.63	---	
RFTS10	ZF0	Chip	10	50	50	1.0	5.08	2.54	1.00	---	
RFTS10	ZE0	Chip	10	50	50	1.0	5.08	2.54	1.00	---	
RFTS10	ZZ0	Chip	10	50	50	1.0	5.08	2.54	1.00	---	
RFTS10	ZY0	Chip	10	50	50	1.0	5.08	2.54	1.00	---	
RFTS50	ZF0	Chip	50	50	50	1.0	5.08	5.08	1.00	---	
RFTS50	ZE0	Chip	50	50	50	1.0	5.08	5.08	1.00	---	
RFTS50	ZZ0	Chip	50	50	50	1.0	5.08	5.08	1.00	---	
RFTS50	ZY0	Chip	50	50	50	1.0	5.08	5.08	1.00	---	

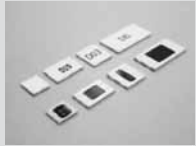
*1 F, E, Z, Y show terminal configuration.

RFT Series										Microwave Flange Terminations
Type	Style	Power (W)	Impedance (ohms)	TCR (ppm/K)	Tol. (%)	L (mm)	W (mm)	H (mm)	P (mm)	
RFT010 120	Flange	10	50	50	1.0	7.62	5.10	3.10	---	
RFT050 120	Flange	50	50	50	1.0	13.08	6.35	3.10	---	
RFT050 130	Flange	50	50	50	1.0	13.08	6.35	3.10	---	
RFT050 140	Flange	50	50	50	1.0	13.08	6.35	3.10	---	
RFT080 120	Flange	80	50	50	1.0	13.08	6.35	3.10	---	
RFT080 130	Flange	80	50	50	1.0	13.08	6.35	3.10	---	
RFT080 140	Flange	80	50	50	1.0	13.08	6.35	3.10	---	
RFT050 110	Flange	50	50	50	1.0	20.30	5.70	3.10	---	
RFT100 110	Flange	100	50	50	1.0	20.30	6.35	3.10	---	
RFT150 110	Flange	150	50	50	1.0	22.10	9.52	3.10	---	
RFT250 110	Flange	250	50	50	1.0	22.10	9.52	4.00	---	
RFT400 110	Flange	400	50	50	1.0	31.80	12.70	5.33	---	
RFT600 110	Flange	600	50	50	1.0	48.26	26.42	5.59	---	

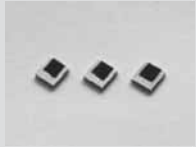
RFA Series										Microwave Chip Attenuators
Type	Style	Power (W)	Attenuation (dB)	Imp (ohms)	Tol. (%)	L (mm)	W (mm)	H (mm)	P (mm)	
RFA001 010	Chip	1.0	*1	50	4.0	4.00	4.00	0.65	---	
RFA010 010	Chip	10	*2	50	4.0	5.08	2.54	1.1	---	
RFA010 020	Chip	10	*2	50	4.0	5.08	2.54	1.1	---	
RFA020 010	Chip	20	*2	50	4.0	5.08	5.08	1.1	---	
RFA040 010	Chip	40	*2	50	4.0	5.08	5.08	1.1	---	
RFA100 030	Chip	100	*2	50	4.0	5.72	8.90	1.1	---	
RFA150 030	Chip	150	*2	50	4.0	6.35	9.52	1.1	---	
		*1 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20 dB		*2 10dB, 20dB, 30dB						

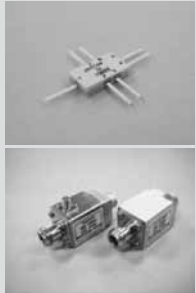
RFA Series										Microwave Flange Attenuators
Type	Style	Power (W)	Attenuation (dB)	Imp (ohms)	Tol. (%)	L (mm)	W (mm)	H (mm)	P (mm)	
RFA010 120	Flange	10	*1	50	4.0	7.62	5.10	3.10	---	
RFA020 120	Flange	20	*2	50	4.0	13.08	6.35	3.10	---	
RFA040 120	Flange	40	*2	50	4.0	13.08	6.35	3.10	---	
RFA100 110	Flange	100	*2	50	4.0	20.30	5.90	2.70	---	
RFA150 110	Flange	150	*2	50	4.0	22.10	9.52	2.70	---	
		*1 1, 3, 6, 10, 20, 30 dB		*2 10dB, 20dB, 30dB						

RFA50T Series										Microwave Radial Leaded Attenuators
Type	Style	Power (W)	Attenuation (dB)	Imp (ohms)	Tol. (%)	W (mm)	H (mm)	L (mm)	P (mm)	
RFA50TF	Radial	---	*1	50	1.0	8.00	7.00	3.0	2.54	
RFA75TF	Radial	---	*1	75	1.0	8.00	7.00	3.0	2.54	
RFA300TF	Radial	---	*1	300	1.0	8.00	7.00	3.0	2.54	
RFA600TF	Radial	---	*1	600	1.0	8.00	7.00	3.0	2.54	
RFA50T	Radial	---	*1	50	1.0	13.00	11.50	2.5	5.0	
RFA75T	Radial	---	*1	75	1.0	13.00	11.50	2.5	5.0	
RFA300T	Radial	---	*1	300	1.0	13.00	11.50	2.5	5.0	
RFA600T	Radial	---	*1	600	1.0	13.00	11.50	2.5	5.0	
		*1 2,3,4,5,6,7,8,9,10,16, 20,30 dB								


RFA Series										Microwave Coaxial Attenuators
Type	Style	Power (W)	Attenuation (dB)	Imp (ohms)	Tol. (%)	L (mm)	W (mm)	H (mm)	P (mm)	
RFA54DD	Coax	0.25	*1	50 *2	2.0	5.00	3.80	0.70	---	
RFA55DD	Coax	0.25	*1	50 *2	2.0	5.00	4.50	0.70	---	
RFA85DD	Coax	0.50	*1	50 *2	2.0	8.00	5.25	0.70	---	
RFA67DD	Coax	1.00	*1	50 *2	2.0	6.00	7.00	0.70	---	
RFA37DD	Coax	1.00	*1	50 *2	2.0	13.00	7.00	0.70	---	


*1 2,3,4,5,6,7,8,9,10,16, 20,30 dB, *2 75 ohm impedance is available by additional characters "DC"

RFD Series										Microwave Coaxial Terminations
Type	Style	Power (W)	Impedance (ohms)	TCR (ppm/K)	Tol. (%)	L (mm)	W (mm)	H (mm)	P (mm)	
RFD3350	Coax	0.25	50	50	2.0	3.80	2.70	0.70	---	
RFD4450	Coax	0.25	50	50	2.0	3.80	2.70	0.70	---	
RFD5450	Coax	0.50	50	50	2.0	5.40	4.20	0.70	---	
RFD8750	Coax	1.00	50	50	2.0	8.00	7.00	0.70	---	

JSTC Series										Multi-junction Thermal Converters
Type	Style	Power (W)	Input Resistance (ohms)	Output Resistance (ohms)	Sensitivity (V/W)	L (mm)	W (mm)	H (mm)	P (mm)	
JSTC04	Device	0.10	*1	< 400	0.6	15.00	9.00	3.50	---	
JSTC05	Device	0.10	*1	< 400	0.6	15.00	9.00	3.50	---	
JSTC06	Device	0.10	*1	< 400	0.6	15.00	9.00	3.50	---	
TVC04A	Unit	0.10	*1	< 400	0.6	73.5	28.0	37.6	---	
TVC05B	Unit	0.10	*1	< 400	0.6	73.5	28.0	28.0	---	
TVC06A	Unit	0.10	*1	< 400	0.6	73.5	28.0	37.6	---	
TVC06B	Unit	0.10	*1	< 400	0.6	73.5	28.0	28.0	---	
TVCC04AR	Case	---	---	---	---	35.0	28.0	28.0	---	
TVCC04AP	Case	---	---	---	---	35.0	28.0	28.0	---	
TVCC05BR	Case	---	---	---	---	35.0	28.0	28.0	---	
TVCC05BP	Case	---	---	---	---	35.0	28.0	28.0	---	
TVCC06AR	Case	---	---	---	---	35.0	28.0	28.0	---	
TVCC06AP	Case	---	---	---	---	35.0	28.0	28.0	---	
TVCC06BR	Case	---	---	---	---	35.0	28.0	28.0	---	
TVCC06BP	Case	---	---	---	---	35.0	28.0	28.0	---	

*1 100, 200, 500, 700, 1K, 2Kohm

LP Series										Multi-junction Thermal Converters
Type	Style	Power (W)	Input Resistance (ohms)	Output Resistance (ohms)	Sensitivity (V/W)	L (mm)	W (mm)	H (mm)	P (mm)	
LP73F	---	0.01	50	2K +/- 1K	13 +/- 2	15.00	15.00	3.90	---	
LP34B	---	0.01	50, 75	< 3K	> 2	25.00	12.50	4.50	---	
LP34TW	---	0.01	50, 75	< 12K	> 1.4	32.00	22.00	5.50	---	

LP Series										Thermopile Detectors
Type	Style	Power (W)	Response (ms)	Output Resistance (ohms)	Sensitivity (V/W)	D (mm)	H (mm)	L (mm)	P (mm)	
LP111S	TO5	0.01	45	2K	10.0	9.05	3.5	---	---	
LP123S	---	0.01	45	1K	5.0	9.05	3.5	---	---	
LP231S	---	0.01	250	4K	4.5	15.24	4.4	---	---	
LP31B	---	0.01	4,000	6.5K	0.45	38.00	10.0	---	---	

Standard Significant Resistance Value, TCR code and Tolerance code, '+' shows modified

E6+	E12+	E24+		E96+						
1.0	1.0	1.0	3.3	1.00	1.43	2.05	2.94	4.22	6.04	8.66
1.5	1.2	1.1	3.6	1.02	1.47	2.10	3.01	4.32	6.19	8.87
2.2	1.5	1.2	3.9	1.05	1.50	2.15	3.09	4.42	6.34	9.09
3.3	1.8	1.3	4.3	1.07	1.54	2.21	3.16	4.53	6.49	9.31
4.7	2.2	1.5	4.7	1.10	1.58	2.26	3.24	4.64	6.65	9.53
(5.0)	2.7	1.6	(5.0)	1.13	1.62	2.32	3.32	4.75	6.81	9.76
6.8	3.3	1.8	5.1	1.15	1.65	2.37	3.40	4.87	6.98	
	3.9	2.0	5.6	1.18	1.69	2.43	3.48	4.99	7.15	
	4.7	2.2	6.2	1.21	1.74	2.49	3.57	5.11	7.32	
	(5.0)	2.4	6.8	1.24	1.78	2.55	3.65	5.23	7.50	
	5.6	(2.5)	7.5	1.27	1.82	2.61	3.74	5.36	7.68	
	6.8	2.7	8.2	1.30	1.87	2.67	3.83	5.49	7.87	
	8.2	3.0	9.1	1.33	1.91	2.74	3.92	5.62	8.06	
				1.37	1.96	2.80	4.02	5.76	8.25	
				1.40	2.00	2.87	4.12	5.90	8.45	

Table 1. Resistance value, E6+, E12+, E24+ and E96

TCR		Tolerance	
X	+/- 1ppm/C	T	+/-0.01%
Y	+/- 2ppm/C	Q	+0.02%
W	+/- 2.5ppm/C	A	+0.05%
Z	+/- 5ppm/C	B	+0.10%
N	+/- 10ppm/C	C	+0.25%
L	+/- 15ppm/C	D	+0.50%
E	+/- 25ppm/C	F	+1.00%
C	+/- 50ppm/C	G	+2.00%
A	+/-100ppm/C	J	+5.00%
H	+/-250ppm/C	K	+/-10.0%
		M	+/-20.0%

Table 2. TCR and Tolerance

Year	Month	Marking Date code
2011	JAN	11
2011	FEB	12
2011	MAR	13
2011	APR	14
2011	MAY	15
2011	JUN	16
2011	JUL	17
2011	AUG	18
2011	SEP	19
2011	OCT	1X
2011	NOV	1Y
2011	DEC	1Z

Table 3. Date code

Linear Resistance Change (ppm) of Ni-Cr Thin-film

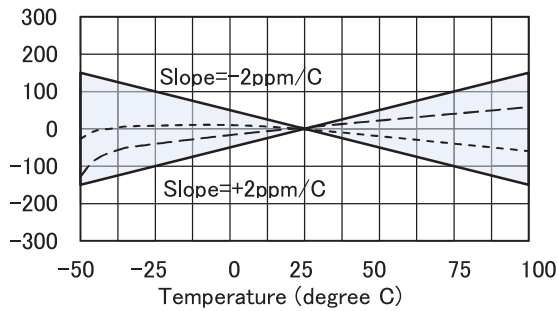


Figure 1. Resistance change of Precision.

Type	90% Failure Rate (Fit)
RP-24/RP-44	0.00003925
RNP-20S	0.00002058
RPM300	0.00620000
WSL8	0.00015000

Table 4. Failure Rate, Long Life Resistor

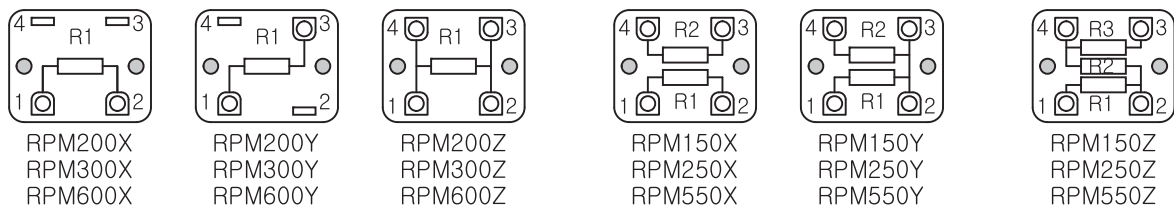
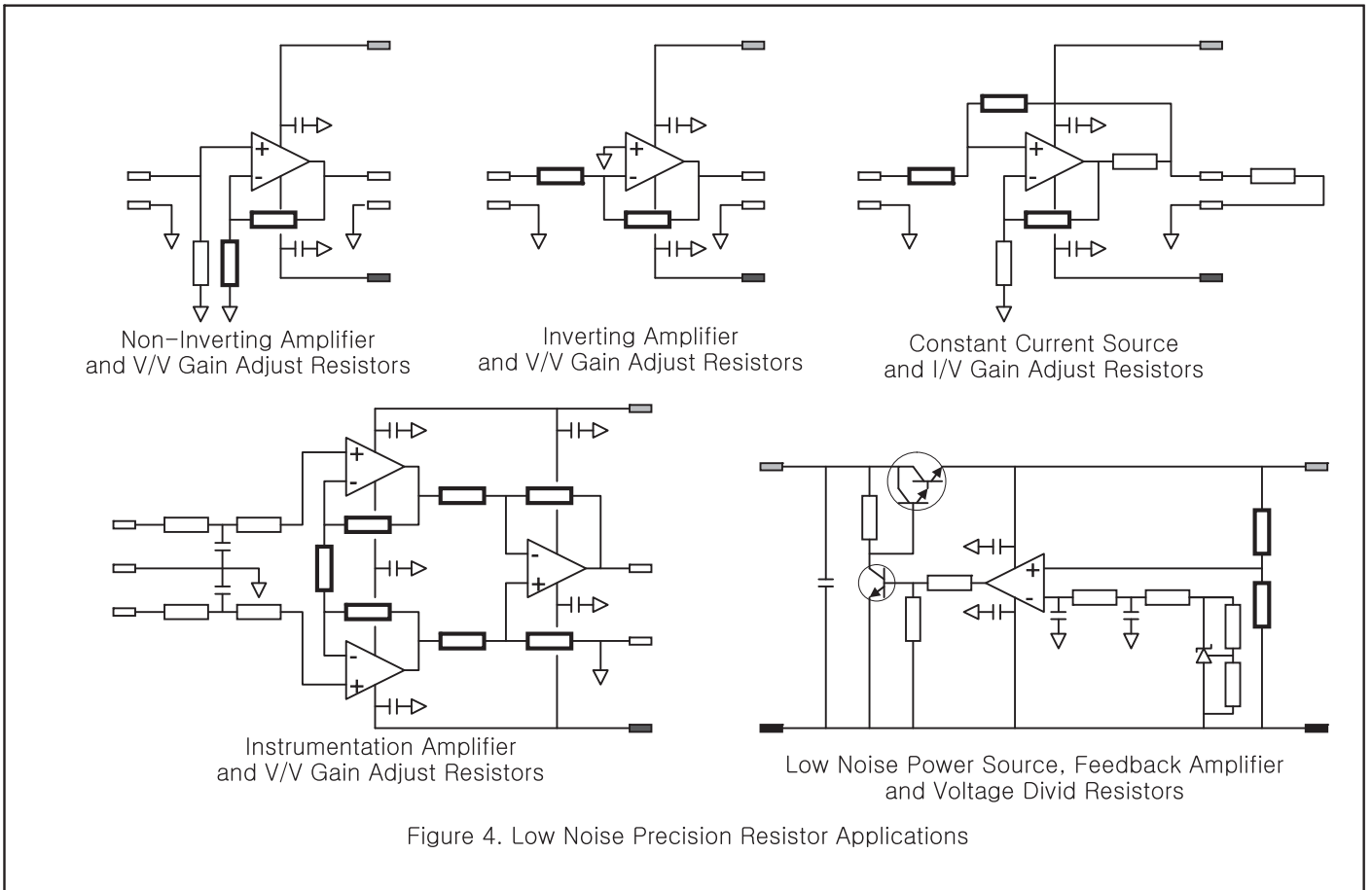
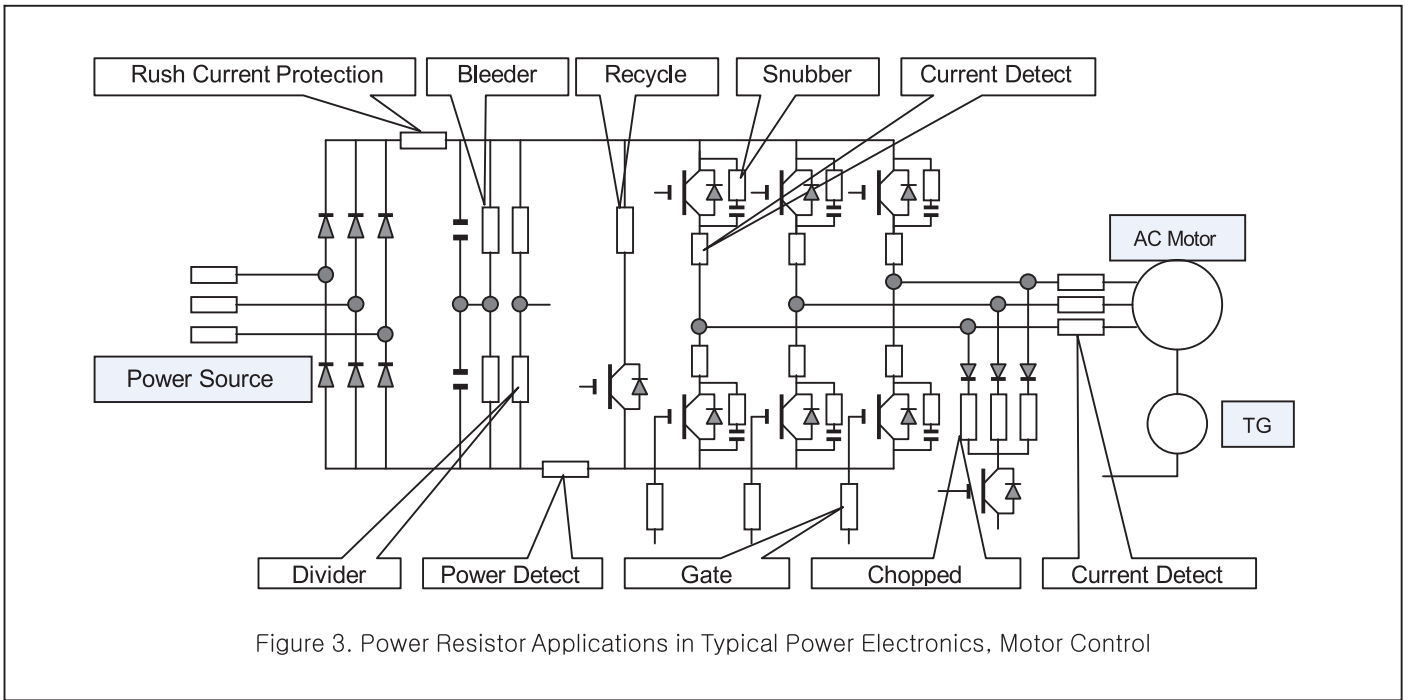
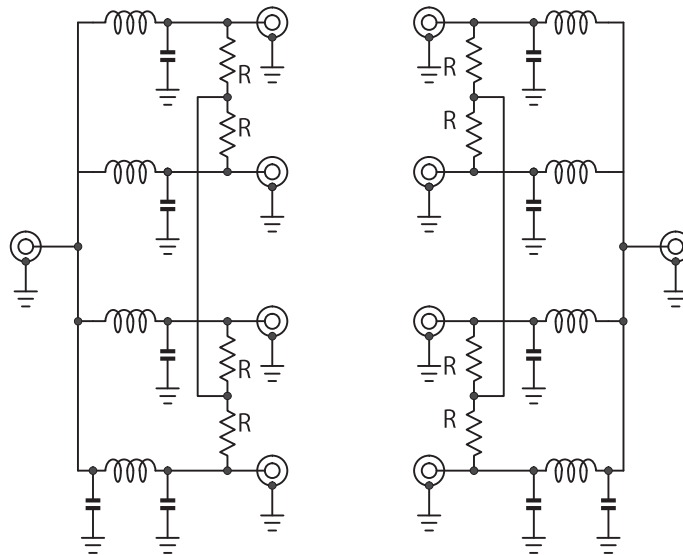
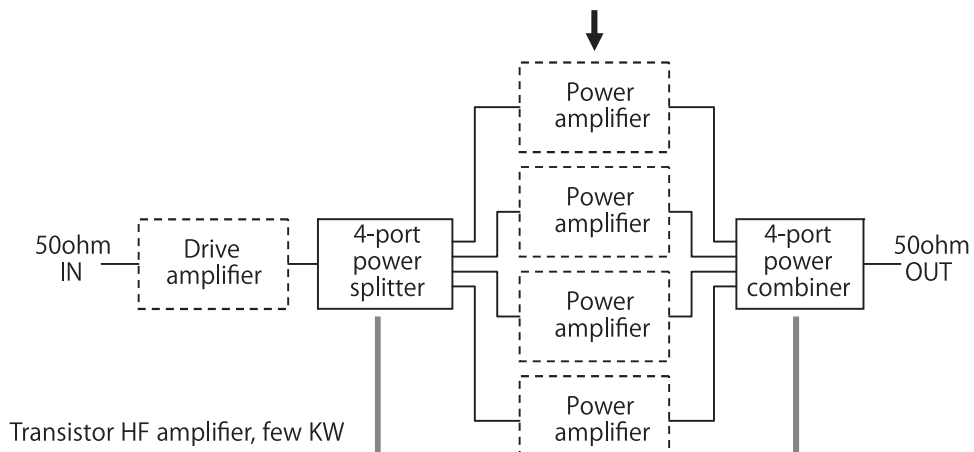
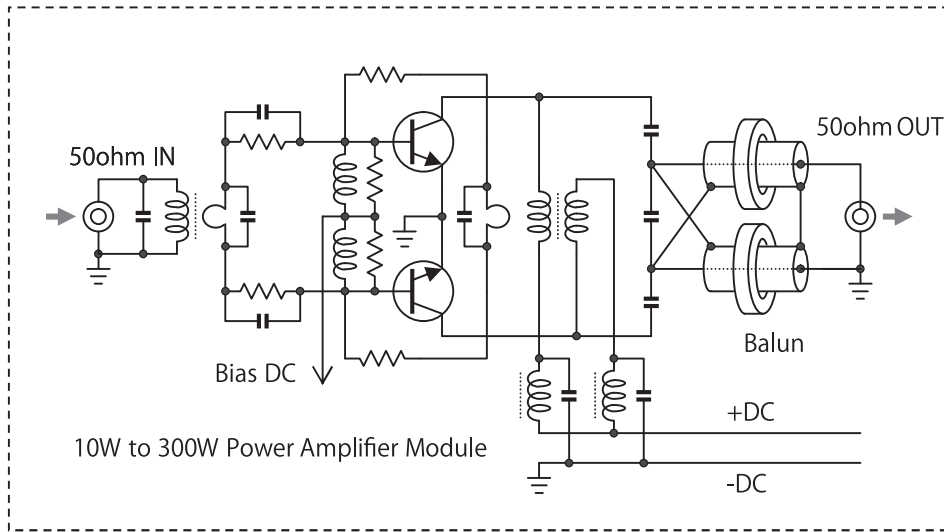


Figure 2. Schematics for SOT227 Power Resistors





R: RFRF150C50ohmF/RFRF250C50ohmF

Figure 5. Lumped constant power splitter and power combiner

Return Loss, Reflection, VSWR

S11(dB)	Γ	VSWR
1	1.122018	17.3910
2	1.258925	8.7242
3	1.412538	5.8480
4	1.584893	4.4194
5	1.778279	3.5698
6	1.995262	3.0095
7	2.238721	2.6146
8	2.511886	2.3229
9	2.818383	2.0999
10	3.162278	1.9250
11	3.548134	1.7849
12	3.981072	1.6709
13	4.466836	1.5769
14	5.011872	1.4985
15	5.623413	1.4326
16	6.309573	1.3767
17	7.079458	1.3290
18	7.943282	1.2880
19	8.912509	1.2528
20	10.000000	1.2222
21	11.220185	1.1957
22	12.589254	1.1726
23	14.125375	1.1524
24	15.848932	1.1347
25	17.782794	1.1192
26	19.952623	1.1055
27	22.387211	1.0935
28	25.118864	1.0829
29	28.183829	1.0736
30	31.622777	1.0653
31	35.481339	1.0580
32	39.810717	1.0515
33	44.668359	1.0458
34	50.118723	1.0407
35	56.234133	1.0362
36	63.095734	1.0322
37	70.794578	1.0287
38	79.432823	1.0255
39	89.125094	1.0227
40	100.000000	1.0202
41	112.201845	1.0180
42	125.892541	1.0160
43	141.253754	1.0143
44	158.489319	1.0127
45	177.827941	1.0113
46	199.526231	1.0101
47	223.872114	1.0090
48	251.188643	1.0080
49	281.838293	1.0071
50	316.227766	1.0063
51	354.813389	1.0057
52	398.107171	1.0050
53	446.683592	1.0045
54	501.187234	1.0040
55	562.341325	1.0036
56	630.957344	1.0032
57	707.945784	1.0028
58	794.328235	1.0025
59	891.250938	1.0022
60	1000.000000	1.0020

Attenuation / Gain, Vout/Vin Ratio (dB)

+/- dB	Vout/Vin	Vin/Vout
0.0	1.000000	1.000000
0.1	1.011579	0.988553
0.2	1.023293	0.977237
0.3	1.035142	0.966051
0.4	1.047129	0.954993
0.5	1.059254	0.944061
0.6	1.071519	0.933254
0.7	1.083927	0.922571
0.8	1.096478	0.912011
0.9	1.109175	0.901571
1.0	1.122018	0.891251
2.0	1.258925	0.794328
3.0	1.412538	0.707946
4.0	1.584893	0.630957
5.0	1.778279	0.562341
6.0	1.995262	0.501187
7.0	2.238721	0.446684
8.0	2.511886	0.398107
9.0	2.818383	0.354813
10	3.162278	0.316228
11	3.548134	0.281838
12	3.981072	0.251189
13	4.466836	0.223872
14	5.011872	0.199526
15	5.623413	0.177828
16	6.309573	0.158489
17	7.079458	0.141254
18	7.943282	0.125893
19	8.912509	0.112202
20	10.000000	0.100000
21	11.220185	0.089125
22	12.589254	0.079433
23	14.125375	0.070795
24	15.848932	0.063096
25	17.782794	0.056234
26	19.952623	0.050119
27	22.387211	0.044668
28	25.118864	0.039811
29	28.183829	0.035481
30	31.622777	0.031623
31	35.481339	0.028184
32	39.810717	0.025119
33	44.668359	0.022387
34	50.118723	0.019953
35	56.234133	0.017783
36	63.095734	0.015849
37	70.794578	0.014125
38	79.432823	0.012589
39	89.125094	0.011220
40	100.000000	0.010000
41	112.201845	0.008913
42	125.892541	0.007943
43	141.253754	0.007079
44	158.489319	0.006310
45	177.827941	0.005623
46	199.526231	0.005012
47	223.872114	0.004467
48	251.188643	0.003981
49	281.838293	0.003548
50	316.227766	0.003162

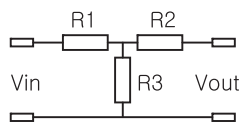
Transformation between VSWR and S11:

$$VSWR = \frac{1+|\Gamma|}{1-|\Gamma|} \dots\dots\dots |\Gamma| = 10^{\frac{S11}{20}}$$

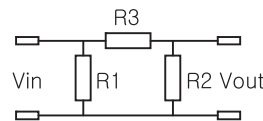
$$|\Gamma| = \frac{VSWR - 1}{VSWR + 1} \dots\dots\dots S11 = -(-20 \log |\Gamma|)$$

Resistive Attenuator and Resistance Values

Circuit T Attenuator, Impedance 50 OHMS



Circuit PAI Attenuator, Impedance 50 OHMS



Attenuation (dB)	Vin/Vout (k)	R1 (OHMS)	R2 (OHMS)	R3 (OHMS)	Attenuation (dB)	Vin/Vout (k)	R1 (OHMS)	R2 (OHMS)	R3 (OHMS)
0	1.000				0	1.000			
1	1.122	2.875	2.875	433.337	1	1.122	869.548	869.548	5.769
2	1.259	5.731	5.731	215.240	2	1.259	436.212	436.212	11.615
3	1.413	8.550	8.550	141.926	3	1.413	292.402	292.402	17.615
4	1.585	11.314	11.314	104.829	4	1.585	220.971	220.971	23.848
5	1.778	14.006	14.006	82.241	5	1.778	178.489	178.489	30.398
6	1.995	16.614	16.614	66.931	6	1.995	150.476	150.476	37.352
7	2.239	19.124	19.124	55.802	7	2.239	130.728	130.728	44.801
8	2.512	21.525	21.525	47.309	8	2.512	116.143	116.143	52.844
9	2.818	23.811	23.811	40.592	9	2.818	104.994	104.994	61.589
10	3.162	25.975	25.975	35.136	10	3.162	96.248	96.248	71.151
11	3.548	28.013	28.013	30.616	11	3.548	89.244	89.244	81.657
12	3.981	29.924	29.924	26.810	12	3.981	83.545	83.545	93.247
13	4.467	31.708	31.708	23.568	13	4.467	78.845	78.845	106.074
14	5.012	33.366	33.366	20.780	14	5.012	74.926	74.926	120.309
15	5.623	34.902	34.902	18.363	15	5.623	71.629	71.629	136.140
16	6.310	36.319	36.319	16.257	16	6.310	68.834	68.834	153.777
17	7.079	37.623	37.623	14.413	17	7.079	66.449	66.449	173.455
18	7.943	38.818	38.818	12.792	18	7.943	64.402	64.402	195.435
19	8.913	39.912	39.912	11.363	19	8.913	62.638	62.638	220.008
20	10.000	40.909	40.909	10.101	20	10.000	61.111	61.111	247.500
21	11.220	41.817	41.817	8.984	21	11.220	59.785	59.785	278.276
22	12.589	42.641	42.641	7.994	22	12.589	58.629	58.629	312.746
23	14.125	43.389	43.389	7.115	23	14.125	57.619	57.619	351.365
24	15.849	44.065	44.065	6.335	24	15.849	56.734	56.734	394.646
25	17.783	44.676	44.676	5.641	25	17.783	55.958	55.958	443.164
26	19.953	45.227	45.227	5.024	26	19.953	55.276	55.276	497.563
27	22.387	45.724	45.724	4.476	27	22.387	54.676	54.676	558.564
28	25.119	46.171	46.171	3.987	28	25.119	54.146	54.146	626.976
29	28.184	46.573	46.573	3.553	29	28.184	53.679	53.679	703.709
30	31.623	46.935	46.935	3.165	30	31.623	53.266	53.266	789.779
31	35.481	47.259	47.259	2.821	31	35.481	52.900	52.900	886.329
32	39.811	47.550	47.550	2.513	32	39.811	52.577	52.577	994.640
33	44.668	47.810	47.810	2.240	33	44.668	52.290	52.290	1,116.149
34	50.119	48.044	48.044	1.996	34	50.119	52.036	52.036	1,252.469
35	56.234	48.253	48.253	1.779	35	56.234	51.810	51.810	1,405.409
36	63.096	48.440	48.440	1.585	36	63.096	51.610	51.610	1,576.997
37	70.795	48.607	48.607	1.413	37	70.795	51.433	51.433	1,769.511
38	79.433	48.757	48.757	1.259	38	79.433	51.275	51.275	1,985.506
39	89.125	48.890	48.890	1.122	39	89.125	51.135	51.135	2,227.847
40	100.000	49.010	49.010	1.000	40	100.000	51.010	51.010	2,499.750



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