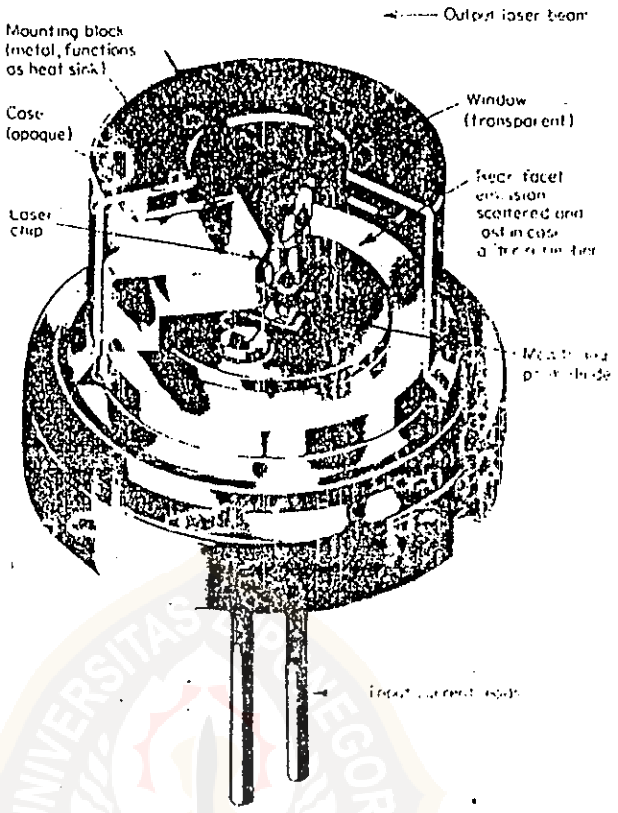
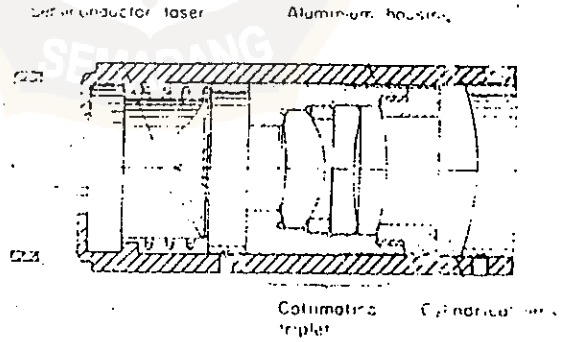
LAMPIRAN A : TIPE LASER SEMIKONDUKTOR



(a)



(b)

LAMPIRAN B : LITERATUR PABRIK DARI LASER SEMIKONDUKTOR

DIY Kit 41. MINIATURE 5mW VISIBLE RED LASER DIODE MODULE

If you want to experiment with laser light then this is the way to do it. Buy the laser module, connect it to a 3.0 VDC source and there it is. NOTE: never look into the laser light. It can easily harm your eyes permanently. Do not shine it at a persons face.

Output power:	5 mW.
Wavelength:	670 nm, deep red. Wavelength is a function of temperature. At 0°C it is 665nm increasing in a linear fashion to 675nm at 40°C.
Collimating lens:	acrylic, aspheric, anti-reflective coated.
Operating voltage:	3.0 V DC. Do not go over 3.0V. You will just burn out the diode. Over 10 hours or ½ AA batteries.
Operating current:	85mA.
Laser diode:	Sony SLD1122V 1
Case:	brass tube.
Dimensions:	cylinder 18.5mm x 11.5mm (diam.), 0.75" x 0.45".
Beam:	6mm at 5 meters
Beam diameter:	typically 4mm x 6mm.
Operating Temp :	zero to 40 degrees Centigrade.

You can make your own laser pointer or security beam fence with the module, a press button switch and a battery holder supplied. Just add 2 x AA batteries.

LASER DIODES

Laser Diodes (LD) have become the most widely used type of lasers. They are found in CD players, video disks, CD-ROM, printers and supermarket checkout counters where they scan the bar code printed on your purchases to automate and speed-up check-out time. Only laser light can be used in these applications. Polychromatic light (multi-wavelength) cannot be used. Monochromatic light is required.

Compared to the older He-Ne lasers, LDs are smaller, cheaper and far less complicated (both in their own physical size and the support electronics to power them.) Standard LDs are made from gallium-aluminium-arsenide. They give laser light at 775nm which is in the near infra-red part of the spectrum. The newer LDs are made from indium-gallium-aluminium-phosphide which gives laser light at 665nm (red.) It is these visible red LD modules which are used in barcode readers. These readers scan the white and black bars of a barcode; the white bars reflect light which falls on a photodiode while the black bars absorb light. The contrast between reflected and absorbed light becomes greater as the wavelength becomes smaller. Wavelengths above about 780nm cannot be used.

Most CD players, CD_ROM and video disks use 775nm LD modules. On a CD player this allows a distance between tracks of 1.9 um. This gives a total of 18,000 tracks on a 3.3cm wide CD recording surface. Now if smaller 660nm light could be used the number of tracks (and thus the playing time) could be increased by 18%. Blue laser light at 428nm and 523nm is now being looked at for the next generation of these consumer goods for even greater information storage densities - and playback times.

The actual emission surface of LDs is small - only 2.5 square mm. Light is not only emitted forward. About 5% is emitted backwards from its backplane. This falls onto a photodiode whose resistance varies in direct proportion to the intensity. This allows a feedback circuit controlled by the photodiode to regulate the current through the LD. Despite the fact that the photodiode is contained in the same housing the whole unit is referred to as the laser diode. Laser light from a LD is not produces in a narrow beam. A lens system is required to collimate the beam.

Efficient heat sinking is necessary since a temperature rise causes a decrease of optical output power.

(Revised documentation, June 1994.)

LAMPIRAN C : KARAKTERISTIK TRANSISTOR

TRANSISTOR NUMBER	P M O A L T	PACK-AGE	LEAD INFO	V_{CB} MAX	V_{CE} MAX	V_{EB} MAX	I_C MAX	T_J MAX	P TOT	F_T MIN	C_{OB} MAX	H_{FE}	H_{FE} BIAS	USE	MFR	EURO EQUIV	USA EQUIV
2N2172	P G	TO5	L04	20V	15V	.	500MA	85C	200MWF	6M	20P	30/150	10MA	RMS	OBS	A3Y27	2N1305
2N2173	P G	TO39	L04	25V	15V	.	750MA	100C	240MWF	.	6P	30MN	200MA	RMS	OBS	A3Y27	2N1306
2N2175	P S	TO5	L04	6V	6V	.	50MA	175C	100MWF	10M	10P	30MN	20UA	ALN	OBS	BC326	2N2605
2N2176	P S	TO18	L01	6V	6V	.	50MA	175C	100MWF	10M	10P	30MN	20UA	ALN	OBS	BC326	2N2605
2N2177	P S	TO5	L04	6V	6V	.	50MA	150C	100MWF	6M	14P	15MN	5UA	ALN	OBS	BC326	2N2605
2N2178	P S	TO18	L01	6V	6V	.	50MA	150C	100MWF	6M	14P	15MN	5UA	ALN	OBS	BC326	2N2605
2N2180	P G	X18	M11	15V	6V	15V	50MA	100C	50MWF	60M	6P	120TP	500UA	RLS	OBS	OC44	2N2614
2N2181	P S	TO1	L02	25V	25V	.	50MA	140C	150MWF	6M	12P	10MN	5MA	ALC	OBS	BCY94	2N2946A
2N2182	P S	TO1	L02	25V	25V	.	50MA	140C	150MWF	6M	12P	10MN	5MA	ALC	OBS	BCY94	2N2946A
2N2183	P S	TO1	L02	15V	10V	.	50MA	140C	150MWF	6M	12P	10MN	5MA	ALC	OBS	BCY94	2N2946A
2N2184	P S	TO1	L02	15V	10V	.	50MA	140C	150MWF	6M	12P	10MN	5MA	ALC	OBS	BCY94	2N2946A
2N2185	P S	TO18	L01	30V	30V	.	50MA	140C	150MWF	6500K	9P	10MN	5MA	ALC	OBS	BCY94	2N2946A
2N2186	P S	TO18	L01	30V	30V	.	50MA	140C	150MWF	6500K	9P	10MN	5MA	MPP	OBS	BCY94x2	2N2946A
2N2187	P S	TO18	L01	30V	30V	.	50MA	140C	150MWF	6500K	9P	10MN	5MA	MPP	OBS	BCY94x2	2N2946A
2N2188	P G	TO1H	L02	40V	40V	.	30MA	75C	125MWF	60M	2P5	40MN	2MA	RLG	OBS	AF124	2N990
2N2189	P G	TO1H	L02	40V	40V	.	30MA	75C	125MWF	102M	2P5	60MN	2MA	RLG	OBS	AF124	2N990
2N2190	P G	TO1H	L02	60V	60V	.	30MA	75C	125MWF	60M	2P5	40MN	2MA	RLG	OBS	AF124	2N990
2N2191	P G	TO1H	L02	60V	60V	.	30MA	75C	125MWF	102M	2P5	60MN	2MA	RLG	OBS	AF124	2N990
2N2192	N S	TO5	L04	80V	40V	5V	1A	200C	800MWF	50M	20P	100MN	150MA	RMS	MOT	BFY50	2N2297
2N2192A	N S	TO5	L04	80V	40V	5V	1A	200C	800MWF	50M	20P	100MN	150MA	RMS	MOT	BFY50	2N2297
2N2192B	N S	TO5	L04	80V	40V	5V	1A	200C	800MWF	50M	20P	100MN	150MA	AMG	MOT	BFY50	2N2297
2N2193	N S	TO5	L04	80V	50V	8V	1A	175C	800MWF	50M	20P	40/120	150MA	AMG	MOT	BSW66	2N4001
2N2193A	N S	TO5	L04	80V	50V	8V	1A	175C	800MWF	50M	20P	40/120	150MA	AMG	MOT	BFY50	2N2297
2N2193B	N S	TO5	L04	80V	50V	8V	1A	200C	800MWF	50M	20P	40/120	150MA	AMG	MOT	BFY50	2N2297
2N2193S	N S	TO39	L04	80V	50V	8V	1A	175C	800MWF	50M	20P	40/120	1A	AMG	MOT	BFY50	2N2297
2N2193AS	N S	TO39	L04	80V	50V	8V	1A	175C	800MWF	50M	20P	40/120	150MA	AMG	MOT	BFY50	2N2297
2N2193BS	N S	TO39	L04	80V	50V	8V	1A	200C	800MWF	50M	20P	40/120	150MA	AMG	MOT	BFY50	2N2297
2N2194	N S	TO5	L04	60V	40V	5V	1A	200C	800MWF	50M	20P	20/80	150MA	AMG	MOT	BFY50	2N2297
2N2194A	N S	TO5	L04	60V	40V	5V	1A	200C	800MWF	50M	20P	20/80	150MA	AMG	MOT	BFY50	2N2297
2N2194B	N S	TO5	L04	60V	40V	5V	1A	200C	800MWF	50M	20P	20/80	150MA	AMG	MOT	BFY50	2N2297
2N2194S	N S	TO39	L04	60V	40V	5V	1A	200C	800MWF	50M	20P	20/80	150MA	AMG	MOT	BFY50	2N2297
2N2194AS	N S	TO39	L04	60V	40V	5V	1A	200C	800MWF	50M	20P	20/80	150MA	AMG	MOT	BFY50	2N2297
2N2194BS	N S	TO39	L04	60V	40V	5V	1A	200C	800MWF	50M	20P	20/80	150MA	AMG	MOT	BFY50	2N2297
2N2195	N S	TO5	L04	45V	25V	5V	1A	175C	800MWF	50M	20P	20MN	150MA	AMG	SGS	BFY50	2N2297
2N2195A	N S	TO5	L04	45V	25V	5V	1A	175C	800MWF	50M	20P	20MN	150MA	AMG	SGS	BFY50	2N2297
2N2195B	N S	TO5	L04	45V	25V	5V	1A	200C	800MWF	50M	20P	20MN	150MA	AMG	MOT	BFY50	2N2297
2N2195S	N S	TO39	L04	45V	25V	5V	1A	175C	800MWF	50M	20P	20MN	150MA	AMG	MOT	BFY50	2N2297
2N2195AS	N S	TO39	L04	45V	25V	5V	1A	175C	800MWF	50M	20P	20MN	150MA	AMG	MOT	BFY50	2N2297
2N2195BS	N S	TO39	L04	45V	25V	5V	1A	175C	800MWF	50M	20P	20MN	150MA	AMG	MOT	BFY50	2N2297
2N2196	N S	TO5F	L44	80V	60V	8V	1A	175C	2WF	.	.	30/90	200MA	AMH	SES	.	2N2107
2N2197	N S	TO5F	L44	80V	60V	8V	1A	175C	2WF	.	.	75/200	200MA	AMH	SES	.	2N2107
2N2198	N S	TO3	L04	80V	80V	.	200MA	200C	800MWF	4M	120P	35/55	100MA	AMH	OBS	BSW66	2N1893
2N2199	P G	TO5	L04	15V	10V	.	100MA	100C	75MWF	120M	2P8	9MN	3MA	VLA	OBS	AF106	2N3263
2N2200	P G	TO5	L04	15V	10V	.	100MA	100C	75MWF	120M	2P6	9MN	3MA	VLA	OBS	AF106	2N3263
2N2201	N S	TO5F	L44	120V	100V	.	1A	175C	2WC	10M	75P	23/93	200MA	RME	OBS	BSW67	2N5682
2N2202	N S	OBS	L04	120V	100V	10V	1A	175C	1WF	10M	75P	25/90	200MA	RMS	OBS	BSW66	2N5681
2N2203	N S	OBS	L06	120V	100V	10V	1A	175C	1WF	10M	75P	25/90	200MA	RHS	OBS	BSW66	2N5681
2N2204	N S	OBS	OBS	120V	100V	10V	1A	175C	1WF	10M	75P	25/90	200MA	RMS	OBS	BSW66	2N5181
2N2205	N S	TO18	L01	25V	12V	3V	200MA	175C	300MWF	200M	8P	40/120	10MA	RLS	SGS	BSX20	2N2369
2N2206	N S	TO46	L01	25V	12V	3V	200MA	175C	300MWF	200M	8P	40/120	10MA	RLS	SGS	BSX20	2N2369
2N2207	P G	TO7	L07	70V	50V	.	50MA	75C	200MWF	140M	13P	36/370	10MA	VLA	OBS	.	.
2N2208	P G	TO1H	L06	40V	10V	.	10MA	85C	125MWF	.	3P	30MN	1500UA	RLA	OBS	AFY18	2N2362
2N2209	P G	TO5	L04	30V	12V	.	100MA	85C	150MWF	2M	20P	60MN	24MA	RMS	OBS	A3Y27	2N1305
2N2210	N S	TO53	L04	60V	45V	7V	.	200C	1WF	100M	15P	50/200	150MA	AMG	MCE	BFY50	2N2297
2N2211	P G	TO3	L05	80V	.	.	5A	100C	30WC	.	.	60/140	1A	AMG	OBS	AD132-5	2N1542
2N2212	P G	TO3	L05	120V	120V	1V	10A	100C	60WC	450K	.	53/120	5A	AMH	GPD	AU103	2N5155
2N2214	N S	X41	L84	25V	15V	.	200MA	150C	250MWF	200M	7P	25MN	10MA	VLS	OBS	.	.
2N2218	P S	TO5	L04	150V	100V	.	250MA	200C	800MWF	50M	15P	25/120	50MA	RME	OBS	BFT18	2N4029
2N2217	N S	TO5	L04	60V	30V	5V	800MA	175C	800MWF	250M	8P	20MN	150MA	RMS	MOT	BFX97	2N2219A
2N2217A	N S	TO5	L04	75V	40V	6V	800MA	175C	800MWF	250M	8P	20MN	150MA	RMS	MOT	BFX97	2N2219A
2N2218	N S	TO5	L04	60V	30V	5V	800MA	175C	800MWF	250M	8P	40/120	150MA	RMG	SGS	BSW54	2N2218A
2N2218A	N S	TO5	L04	75V	40V	6V	800MA	175C	800MWF	250M	8P	40/120	150MA	RMG	SGS	BSW54	2N2218A
2N2218S	N S	TO39	L04	60V	30V	5V	800MA	175C	800MWF	250M	8P	40/120	150MA	RMG	MOT	BSW54	2N2218
2N2218AS	N S	TO39	L04	75V	40V	6V	800MA	175C	800MWF	250M	8P	40/120	150MA	RMG	MOT	BSW54	2N2218A
2N2219	N S	TO5	L04	60V	30V	5V	800MA	175C	800MWF	250M	8P	100MN	150MA	RMG	SGS	BSW54	2N2218A
2N2219A	N S	TO5	L04	75V	50V	6V	800MA	175C	800MWF	300M	8P	100MN	150MA	RMG	SGS	BSW54	2N2218A
2N2219S	N S	TO39	L04	60V	30V	5V	800MA	175C	800MWF	250M	8P	100MN	150MA	RMG	MOT	BSW54	2N2219
2N2219AS	N S	TO39	L04	75V	50V	6V	800MA	175C	800MWF	300M	8P	100MN	150MA	RMG	MOT	BSW54	2N2219A
2N2220	N S	TO18	L01	60V	30V	5V	800MA	175C	500MWF	250M	8P	20MN	150MA	RMS	MOT	BFX95	2N2222A
2N2220A	N S	TO18	L01	75V	40V	6V	800MA	175C	500MWF	250M	8P	20MN	150MA	RMS	MOT	BFX95	2N2222A
2N2221	N S	TO18	L01	60V	30V	5V	800MA	175C	500MWF	250M	8P	40/120	150MA	RMG	SGS	BSW54	2N2222A
2N2221A	N S	TO18	L01	75V	40V	6V	800MA	175C	500MWF	250M	8P	40/120	150MA	RMG	SGS	BSW54	2N2222A
2N2222	N S	TO18	L01	60V	30V	5V	800MA	175C	500MWF	250M	8P	100MN	150MA	RMG	SGS	BSW54	2N2222A
2N2222A	N S	TO18	L01	75V	40V	6V	800MA	175C	500MWF	300M	8P	100MN	150MA	RMG	SGS	BSW54	2N2222A
2N2223	N S	TO77	N01	100V	80V	7V	500MA	200C	800MWF	50M	15P	50MN	10MA	DUA	TIS	BFX71	2N5 6ME

TRANSISTOR NUMBER	POL	MAT	PACK-AGE	LEAD INFO	V_{CB} MAX	V_{CE} MAX	V_{EB} MAX	I_C MAX	T_J MAX	P TOT	f_T MIN	C_{OB} MAX	H_{FE}	H_{FE} BIAS	USE	MFR	EURO EQUIV	USA EQUIV
2N2948	N	S	TO3	L05	80V	20V	2V	1500MA	175C	25WC	100M	60P	3/60	400MA	VMP	MOT		.
2N2949	N	S	.	L04	85V	40V	3V	700MA	175C	500MWF	100M	20P	5MN	400MA	VMP	MOT	.	.
2N2950	N	S	X26	L59	85V	40V	3V	700MA	175C	700MWF	100M	20P	5MN	400MA	VMP	MOT		.
2N2951	N	S	TO5	L04	60V	20V	5V	250MA	175C	800MWF	200M	8P	20MN	150MA	VMP	MOT		.
2N2951S	N	S	TO39	L04	60V	20V	5V	250MA	175C	800MWF	200M	8P	20MN	150MA	VMP	MOT	BFS10	2N3866
2N2952	N	S	TO18	L01	60V	20V	5V	250MA	175C	500MWF	200M	8P	20MN	150MA	VMP	MOT	.	.
2N2953	P	G	TO1	L02	30V	.	25V	150MA	100C	170MWF	10M	10P	200MN	10MA	ALG	OBS	AC128	2N2706
2N2954	N	S	OBS	OBS	30V	20V	3V	500MA	200C	200MWF	300M	3P8	200MN	10MA	RLS	OBS	.	.
2N2955	P	G	TO18	L01	40V	25V	3V	100MA	100C	300MWF	200M	4P	20/60	50MA	VMS	MOT	ASZ21	.
2N2956	P	G	TO18	L01	40V	20V	3V	100MA	100C	300MWF	250M	4P	40/120	50MA	VMS	MOT	ASZ21	.
2N2957	P	G	TO18	L01	40V	18V	3V	100MA	100C	300MWF	300M	4P	100MN	50MA	VMS	MOT	ASZ21	.
2N2958	N	S	TO5	L04	80V	20V	5V	600MA	175C	800MWF	250M	8P	40/120	150MA	RMG	MOT	BSW54	2N2219A
2N2958S	N	S	TO39	L04	60V	20V	5V	600MA	175C	800MWF	250M	8P	40/120	150MA	RMG	MOT	BSW54	2N2219A
2N2959	N	S	TO5	L04	60V	20V	5V	600MA	175C	800MWF	250M	8P	100MN	150MA	RMG	MOT	BSW54	2N2219A
2N2959S	N	S	TO39	L04	60V	20V	5V	600MA	175C	800MWF	250M	8P	100MN	150MA	RMG	MOT	BSW54	2N2219A
2N2960	N	S	TO5	L04	80V	30V	5V	600MA	200C	800MWF	250M	8P	100MN	150MA	VMS	OBS	BSW54	2N2219A
2N2961	N	S	TO5	L04	60V	30V	5V	600MA	200C	800MWF	250M	8P	30MN	500MA	VMS	OBS	BSW54	2N2219A
2N2962	P	G	X26	L59	40V	18V	1V	300MA	85C	350MWF	560M	10P	.	.	VMA	OBS	.	.
2N2963	P	G	X26	L59	40V	18V	1V	300MA	85C	350MWF	560M	10P	.	.	VMA	OBS	.	.
2N2964	P	G	X26	L59	30V	15V	1V	300MA	85C	350MWF	560M	10P	.	.	VMA	OBS	.	.
2N2965	P	G	X26	L59	30V	15V	1V	300MA	85C	350MWF	560M	10P	.	.	VMA	OBS	.	.
2N2966	P	G	OBS	OBS	20V	20V	.	100MA	100C	60MWF	500M	1P5	6MN	3MA	VLA	OBS	AF139	2N3323
2N2967	N	S	TO18	L01	12V	6V	.	100MA	200C	300MWF	400M	3P	20/120	10MA	ULS	OBS	BSX20	2N2369A
2N2968	P	S	TO5	L04	30V	10V	.	50MA	140C	150MWF	10M	6P	15MN	100UA	RLS	OBS	BFS95	2N4036
2N2969	P	S	TO18	L01	30V	10V	.	50MA	140C	150MWF	10M	6P	15MN	100UA	RLS	OBS	BSW24	2N2907A
2N2970	P	S	TO5	L04	30V	20V	.	50MA	140C	150MWF	8M	6P	15MN	100UA	RLS	OBS	BFS95	2N4036
2N2971	P	S	TO18	L01	30V	20V	.	50MA	140C	150MWF	8M	6P	15MN	100UA	RLS	OBS	BSW24	2N2907A
2N2972	N	S	TO71	N02	45V	45V	6V	30MA	160C	250MWF	60M	4P	80/240	10UA	DUA	MOT	BFY81	2N2977
2N2973	N	S	TO71	N02	45V	45V	6V	30MA	200C	250MWF	60M	4P	150MN	10UA	DUA	MOT	BFY81	.
2N2974	N	S	TO71	N02	45V	45V	6V	30MA	200C	250MWF	60M	4P	60/240	10UA	DUA	MOT	BFY81	.
2N2975	N	S	TO71	N02	45V	45V	6V	30MA	200C	250MWF	60M	4P	150MN	10UA	DUA	MOT	BFY81	.
2N2976	N	S	TO71	N02	45V	45V	6V	30MA	200C	250MWF	60M	4P	60/240	10UA	DUA	MOT	BFY81	.
2N2977	N	S	TO71	N02	45V	45V	6V	30MA	200C	250MWF	50M	4P	150MN	10UA	DUA	MOT	BFY81	.
2N2978	N	S	TO71	N02	60V	60V	6V	30MA	200C	250MWF	60M	4P	60/240	10UA	DUA	MOT	BFY81	.
2N2979	N	S	TO71	N02	60V	60V	6V	30MA	200C	250MWF	60M	4P	150MN	10UA	DUA	MOT	BFY81	.
2N2980	N	S	TO71	N02	100V	60V	6V	500MA	200C	250MWF	60M	4P	25/75	1MA	DUA	MOT	BFY83	2N2060A
2N2981	N	S	TO71	N02	100V	60V	6V	500MA	200C	250MWF	60M	4P	50/200	1MA	DUA	MOT	BFY83	2N2223
2N2982	N	S	TO71	N02	100V	60V	6V	500MA	200C	250MWF	60M	4P	50/200	1MA	DUA	MOT	BFY83	2N2223A
2N2983	N	S	TO5	L04	155V	80V	8V	3A	175C	1WF	50M	50P	20/60	1A	RHH	KER	BSS42	2N5320
2N2984	N	S	TO5	L04	185V	120V	8V	3A	175C	1WF	50M	50P	20/60	1A	RHE	KER	BUY48	2N5238
2N2985	N	S	TO5	L04	155V	80V	6V	3A	175C	1WF	50M	50P	40/120	1A	RHH	KER	BSS42	2N5320
2N2986	N	S	TO5	L04	185V	120V	8V	3A	175C	1WF	50M	50P	40/120	1A	RHE	KER	BUY48	2N5238
2N2987	N	S	TO5	L04	95V	80V	7V	1500MA	200C	1WF	50M	50P	25/75	200MA	RHH	KER	BSS42	2N5320
2N2988	N	S	TO5	L04	155V	100V	7V	1500MA	200C	1WF	50M	50P	25/75	200MA	RHE	KER	BSS42	2N5682
2N2989	N	S	TO5	L04	90V	80V	7V	1500MA	200C	1WF	50M	50P	60/120	200MA	RHH	KER	BSS42	2N5320
2N2990	N	S	TO5	L04	155V	100V	7V	1500MA	200C	1WF	50M	50P	60/120	200MA	RHE	KER	BSS42	2N5682
2N2991	N	S	X26	L59	95V	80V	7V	1A	200C	2WF	30M	50P	25/75	200MA	AMH	TIS	BFY55	2N5477
2N2992	N	S	X26	L59	155V	100V	7V	1A	200C	2WF	30M	50P	20/75	200MA	AMH	TIS	.	2N5479
2N2993	N	S	X26	L59	95V	60V	7V	1A	200C	2WF	30M	50P	60/120	200MA	AMH	TIS	BFY55	2N5478
2N2994	N	S	X26	L59	155V	100V	7V	1A	200C	2WF	30M	50P	60/120	200MA	AMH	TIS	.	2N5480
2N2995	N	S	X26	L59	120V	100V	10V	1A	175C	1500MWF	10M	.	25/90	50MA	ALS	OBS	.	.
2N2996	P	G	TO72	L06	15V	10V	.	50MA	100C	75MWF	400M	3P	25/500	4MA	VLA	OBS	AF239S	2N3783
2N2997	P	G	TO72	L06	30V	15V	.	50MA	100C	75MWF	400M	1P8	40/500	4MA	VLA	OBS	AF239S	2N3783
2N2998	P	G	TO72	L03	15V	12V	.	20MA	100C	75MWF	600M	1P7	15/300	3MA	ULA	OBS	AF239S	2N3783
2N2999	P	G	TO72	L06	15V	10V	.	20MA	100C	75MWF	1400M	1P7	10MN	3MA	SLA	OBS	.	.
2N3000	P	G	TO5	L04	45V	15V	35V	400MA	85C	150MWF	15M	10P	50MN	1MA	RLA	OBS	ASY27	2N1305
2N3009	N	S	TO18	L01	40V	15V	4V	200MA	200C	360MWF	350M	5P	30/120	30MA	VLS	MOT	BSX20	2N2369
2N3010	N	S	TO18	L01	15V	6V	1V	50MA	175C	300MWF	600M	3P	25/175	10MA	ULS	SGS	BSX20	2N2369
2N3011	N	S	TO18	L01	30V	12V	5V	200MA	175C	360MWF	400M	3P	30/120	10MA	VLS	SGS	BSX20	2N2369
2N3012	P	S	TO18	L01	12V	12V	4V	200MA	175C	360MWF	400M	6P	30/120	30MA	VLS	SGS	BSW24	2N3546
2N3013	N	S	TO18	L01	40V	15V	5V	200MA	175C	360MWF	350M	5P	30/120	30MA	VLS	SGS	BSX20	2N2369
2N3014	N	S	TO18	L01	40V	20V	5V	200MA	200C	360MWF	350M	5P	25MN	10MA	VLS	MOT	BSX20	2N2369
2N3015	N	S	TO5	L04	60V	30V	5V	500MA	175C	800MWF	250M	6P	30/120	150MA	RMS	SGS	BSW54	2N2219A
2N3016	N	S	TO5	L04	100V	50V	4V	2500MA	150C	3300MWC	200M	.	60/150	1A	RHH	OBS	BSV64	2N5784
2N3017	N	S	X26	L59	100V	60V	4V	5A	150C	3300MWC	.	.	60/150	1A	AHS	OBS		.
2N3018	N	S	TO61	L46	100V	50V	4V	10A	150C	25WC	200M	.	80MN	1A	RHP	OBS	BDY63	2N5731
2N3019	N	S	TO5	L04	140V	80V	7V	1A	190C	800MWF	100M	12P	100MN	150MA	AMH	SGS	BSW66	2N4401
2N3019S	N	S	TO39	L04	80V	40V	7V	1A	190C	800MWF	70M	25P	100MN	150MA	AMG	MOT	BFY50	2N3019
2N3020	N	S	TO5	L04	140V	80V	7V	1A	190C	800MWF	80M	12P	40/120	150MA	AMH	SGS	BSW66	2N1893
2N3020S	N	S	TO39	L04	140V	80V	7V	1A	190C	800MWF	80M	12P	40/120	150MA	AMH	MOT	BSW66	2N1893
2N3021	P	S	TO3	L05	30V	30V	4V	3A	175C	25WC	60M	.	20/60	1A	VHS	MOT	.	.
2N3022	P	S	TO3	L05	45V	45V	4V	3A	175C	25WC	60M	.	20/60	1A	VHS	MOT	.	.
2N3023	P	S	TO3	L05	60V	60V	4V	3A	175C	25WC	60M	.	20/30	1A	VHS	MOT	.	.
2N3024	P	S	TO3	L05	30V	30V	4V	3A	175C	25WC	60M	.	50/180	1A	VHS	MOT	.	.
2N3025	P	S	TO3	L05	45V	45V	4V	3A	175C	25WC	60M	.	50/180	1A	VHS	MOT	.	.

LAMPIRAN D : PERHITUNGAN RALAT

Diameter dari laser = 2 mm.

Dari persamaan 2.33 :

$$\Delta d = \frac{\lambda}{2} \quad (\Delta m)$$

Persamaan tersebut merupakan persamaan garis lurus :

$$y = ax + b$$

dengan,

$y = d$

$x = m$

$a = \frac{\lambda}{2}$

$b = 0$

Sedangkan nilai a adalah :

$$a = \frac{n\,(\Sigma x_i . y_i) - (\Sigma x_i)\,(\Sigma y_i)}{n\,(\Sigma x_i^{\,2}) - (\Sigma x_i)^2}$$

$$= 3{,}63.10^{-4} \text{ mm}$$

sehingga λ berharga :

$$\lambda = 2\,a$$

$$= 7{,}27.10^{-4} \text{mm}$$

dengan nilai ketidakpastian untuk a :

$$Sa = Sy \sqrt{\frac{n}{n\,(\Sigma x_i^{\,2}) - (\Sigma x_i)^2}}$$

$$= 4{,}51 \;.\; 10^{-6} \text{ mm}$$

dengan Sy adalah :

$$Sy^2 = \frac{1}{n-2}\left\{\Sigma y_i^2 - \frac{\Sigma x_i^2(\Sigma y_i)^2 - 2\Sigma x_i(\Sigma x_i y_i)\Sigma y_i + n(\Sigma x_i y_i)^2}{n(\Sigma x_i^2) - (\Sigma x_i)^2}\right\}$$

$$= 1{,}54 \cdot 10^{-7}$$

Maka $S\lambda = 2\ Sa = 9{,}02 \cdot 10^{-6}$ mm.

Sedangkan nilai koefisien korelasi yang merupakan ukuran kesempurnaan hubungan antara dua variabel x dan y yang diamati pada persamaan garis lurus y = ax + b yaitu :

$$r = \frac{n(\Sigma x_i y_i) - \Sigma x_i \Sigma y_i}{\sqrt{[n(\Sigma x_i^2) - (\Sigma x_i)^2] - [n(\Sigma y_i^2) - (\Sigma y_i)^2]}}$$

$$= 0{,}9997$$

dapat dipenuhi hubungan $-1 \leq r < 1$, nilai r = 1 dan r = -1 jika dan hanya jika korelasinya sempurna (ada korelasi). Dengan panjang gelombangnya adalah $(7{,}27 \pm 0{,}09) \cdot 10^{-4}$ mm, dan keseksamaan 98,76 %.

Data Diameter Laser d (mm)

1. 2,05
2. 2,05
3. 1,95 $\quad \bar{d} = 2{,}00$ mm
4. 2,00
5. 1,95

$$S_{\bar{d}} = \sqrt{\frac{\sum_{n=1}^{n=5} (d_n - \bar{d})^2}{n\,(n-1)}}$$

$= 0{,}02$ mm

$$d = \bar{d} \pm S_{\bar{d}} = (2{,}00 \pm 0{,}02) \text{ mm}$$

Sehingga sudut penyebaran sinar laser sebesar

$$\Delta\theta = \frac{\bar{\lambda}}{\bar{d}} = 3{,}63 \,.10^{-4}$$

$$\frac{\partial \Delta\bar{\theta}}{\partial \bar{d}} = - \frac{\bar{\lambda}}{\bar{d}^2} = - 1{,}81.10^{-4}$$

$$\frac{\partial \Delta\bar{\theta}}{\partial \bar{\lambda}} = - \frac{1}{\bar{d}} = 0{,}50$$

$$S_{\Delta\bar{\theta}} = \sqrt{\left[\frac{\partial \Delta\bar{\theta}}{\partial \bar{\lambda}}\right]^2 S_{\bar{\lambda}}^{\,2} + \left[\frac{\partial \Delta\bar{\theta}}{\partial \bar{d}}\right]^2 S_{\bar{d}}^{\,2}}$$

$= 6{,}07.10^{-6}$

Sehingga

$\Delta\theta = \Delta\bar{\theta} \pm S_{\Delta\bar{\theta}} = (3{,}63 \pm 0{,}06).10^{-4}$

Keseksamaan = 98,32 %

Untuk menentukan berkas sinar yang sejajar adalah

$$\bar{X} = \frac{\bar{d}^2}{\bar{\lambda}} = 5{,}50.10^{3}$$

$$\frac{\partial \bar{X}}{\partial \bar{d}} = \frac{2\bar{d}}{\bar{\lambda}} = 5{,}50.10^{3}$$

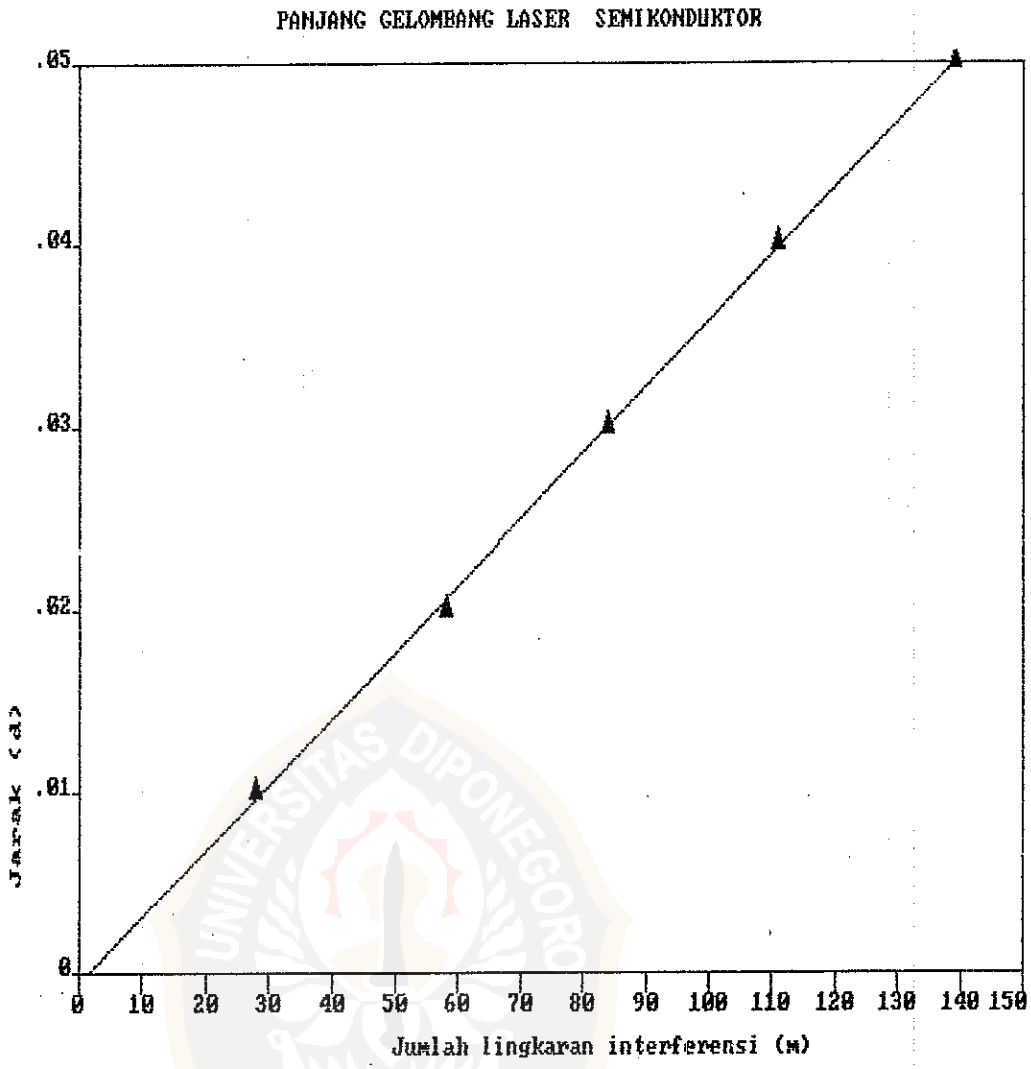
$$\frac{\partial \bar{X}}{\partial \bar{\lambda}} = -\frac{\bar{d}^2}{\bar{\lambda}^2} = 7{,}56.10^{6}$$

$$S_{\bar{X}} = \sqrt{\left(\frac{\partial \bar{X}}{\partial \bar{d}}\right)^2 S_{\bar{d}}^{\,2} + \left(\frac{\partial \bar{X}}{\partial \bar{\lambda}}\right)^2 S_{\bar{\lambda}}^{\,2}}$$

$$= 1{,}40.10^{2} \text{ mm}$$

$$X = \bar{X} \pm S_{\bar{X}} = (5{,}50 \pm 0{,}14).10^{3} \text{ mm}$$

Keseksamaan 97,43 %



THE REGRESSION POLYNOMIAL OF LINE 1 -

(-5.313E-04) + (3.635E-04)*X
THE VARIANCE - 9.252E-08

LAMPIRAN E : FOTO HASIL PENELITIAN

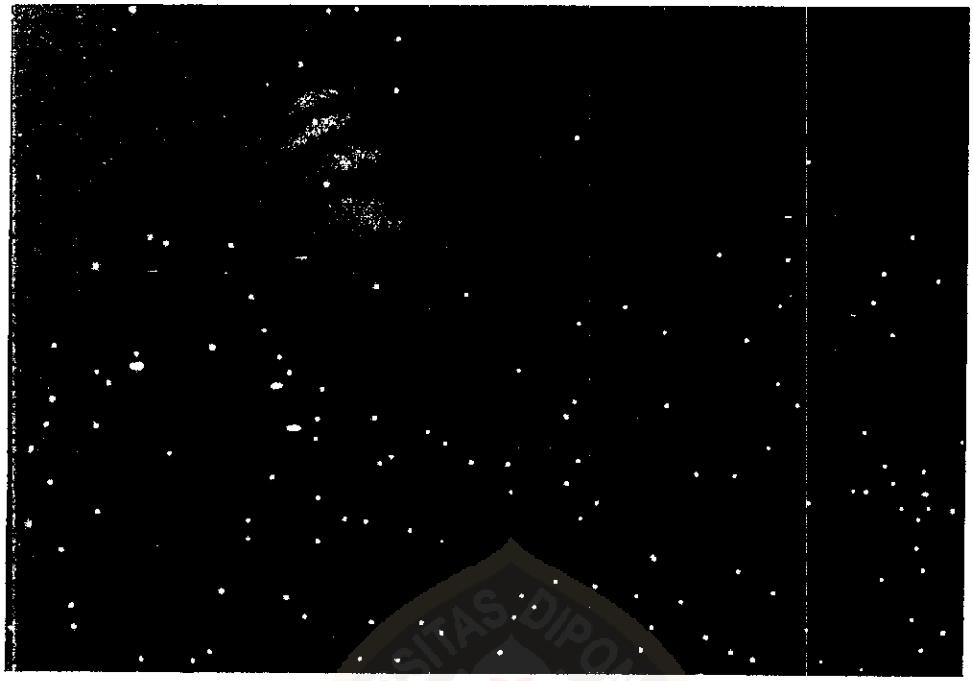


Foto Pola Laser Semikonduktor

Foto Alat Pemulsa Laser Semikonduktor