Microsemi LAWRENCE

TECHNICAL DATA

NPN POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500 / 394

Devices			***Qualified Level***
2N4150	**2N5237**	**2N5238**	**JAN**
2N4150S	**2N5237S**	**2N5238S**	**JANTX**
			JANTXV

MAXIMUM RATINGS

Ratings	Symbol	2N4150 2N4150S	2N5237 2N5237S	2N5238 2N5238S	Unit
Collector-Emitter Voltage	V_{CEO}	70	120	170	Vdc
Collector-Base Voltage	V_{CBO}	100	150	200	Vdc
Emitter-Base Voltage	V_{EBO}	10			Vdc
Collector Current	I_C	10			Adc
Total Power Dissipation @ $T_A = +25^0C$(1) @ $T_C = +100^0C$(2)	P_T	1.0 5.0			W
Operating & Storage Junction Temp. Range	T_J, T_{stg}	-65 to +200			^0C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.020	$^0C/mW$
Junction-to-Ambient	$R_{\theta JA}$	0.175	

1) Derate linearly @ 5.7 mW/^{0}C for $T_A > +25^0C$
2) Derate linearly @ 50 mW/^{0}C for $T_C > +25^0C$

TO- 5*
2N4150, 2N5237,
2N5238

TO-39*
(TO-205AD)
2N4150S, 2N5237S,
2N5238S

*See appendix A for package outline

ELECTRICAL CHARACTERISTICS ($T_C = 25^0C$ unless otherwise noted)

Characteristics		Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS					
Emitter-Base Breakdown Voltage I_E = 10 µAdc		$V_{(BR)EBO}$	7.0		Vdc
Collector-Emitter Breakdown Voltage I_C = 0.1 Adc	2N4150, 2N4150S 2N5237, 2N5237S 2N5238, 2N5238S	$V_{(BR)CEO}$	70 120 170		Vdc
Collector-Emitter Cutoff Current V_{EB} = 0.5 Vdc, V_{CE} = 60 Vdc V_{EB} = 0.5 Vdc, V_{CE} = 110 Vdc V_{EB} = 0.5 Vdc, V_{CE} = 160 Vdc	2N4150, 2N4150S 2N5237, 2N5237S 2N5238, 2N5238S	I_{CEX}		10 10 10	µAdc

ELECTRICAL CHARACTERISTICS (con't)

Characteristics		Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS (con't)					
Collector-Base Cutoff Current					
V_{CE} = 60 Vdc	2N4150, 2N4150S	I_{CEO}		10	µAdc
V_{CE} = 110 Vdc	2N5237, 2N5237S			10	
V_{CE} = 160 Vdc	2N5238, 2N5238S			10	
Emitter-Base Cutoff Current					
V_{BE} = 7.0 Vdc		I_{EBO}		10	µAdc
V_{BE} = 5.0 Vdc				0.1	
Collector-Base Cutoff Current					
V_{CB} = 100 Vdc	2N4150, 2N4150S			10	
V_{CB} = 150 Vdc	2N5237, 2N5237S	I_{CBO}		10	µAdc
V_{CB} = 200 Vdc	2N5238, 2N5238S			10	
V_{CB} = 80 Vdc	All Types			0.1	
ON CHARACTERISTICS (3)					
Forward-Current Transfer Ratio					
I_C = 1.0 Adc, V_{CE} = 5.0 Vdc	2N4150, 2N4150S		50	200	
	2N5237, 2N5237S	h_{FE}	50	225	
	2N5238, 2N5238S		50	225	
I_C = 5.0 Adc, V_{CE} = 5.0 Vdc	All Types		40	120	
I_C = 10 Adc, V_{CE} = 5.0 Vdc	All Types		10	-	
Collector-Emitter Saturation Voltage					
I_C = 5.0 Adc, I_B = 0.5 Adc		$V_{CE(sat)}$		0.6	Vdc
I_C = 10 Adc, I_B = 1.0 Adc				2.5	
Base-Emitter Saturation Voltage					
I_C = 5.0 Adc, I_B = 0.5 Adc		$V_{BE(sat)}$		1.5	Vdc
I_C = 10 Adc, I_B = 1.0 Adc				25	
DYNAMIC CHARACTERISTICS					
Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio					
I_C = 0.2 Adc, V_{CE} = 10 Vdc, f = 10 MHz		$\lvert h_{fe} \rvert$	1.5	7.5	
Forward Current Transfer Ratio					
I_C = 50 mAdc, V_{CE} = 5.0 Vdc, f = 1.0 kHz	2N4150, 2N4150S		40	160	
	2N5237, 2N5237S	h_{fe}	40	160	
	2N5238, 2N5238S		40	250	
Output Capacitance					
V_{CB} = 10 Vdc, I_E = 0, 100 kHz ≤ f ≤ 1.0 MHz		C_{obo}		350	pF

SWITCHING CHARACTERISTICS

Delay Time	V_{CC} = 20 Vdc, V_{BB} = 5.0 Vdc,	t_d		50	µs
Rise Time	I_C = 5.0 Adc, I_{B1} = 0.5 Adc	t_r		500	µs
Storage Time	V_{CC} = 20 Vdc, V_{BB} = 5.0 Vdc,	t_s		1.5	µs
Fall Time	I_C = 5.0 Adc, I_{B1} = $-I_{B2}$ = 0.5 Adc	t_f		500	µs

SAFE OPERATING AREA

DC Tests

T_C = +25^{0}C, 1 Cycle, t = 1.0 s

Test 1

V_{CE} = 40 Vdc, I_C = 0.22 Adc

Test 2

V_{CE} = 70 Vdc, I_C = 90 mAdc

Test 3

V_{CE} = 120 Vdc, I_C = 15 mAdc	2N5237, 2N5237S
V_{CE} = 170 Vdc, I_C = 3.5 mAdc	2N5238, 2N5238S

(3) Pulse Test: Pulse Width = 300µs, Duty Cycle ≤ 2.0%.