

POWER TRANSISTORS

5 Amp, 300V, Planar NPN

JAN, JANTX, & JANTXV 2N5664
 JAN, JANTX, & JANTXV 2N5665
 JAN, JANTX, & JANTXV 2N5666
 JAN, JANTX, & JANTXV 2N5667

FEATURES

- Meets MIL-S-19500/455
- Collector-Base Voltage: up to 400V
- D.C. Collector Current: 5A
- Peak Collector Current: 10A
- Fast Switching

DESCRIPTION

Unitrode high voltage transistors provide a unique combination of low saturation voltage, fast switching, and excellent gain. They are ideally suited for off-line power supply designs and other applications where the increased voltage rating adds to system reliability.

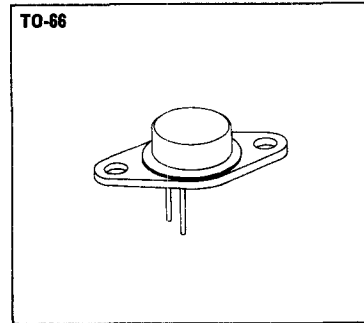
ABSOLUTE MAXIMUM RATINGS

	JAN, JANTX, & JANTXV	JAN, JANTX, & JANTXV	JAN, JANTX, & JANTXV	JAN, JANTX, & JANTXV
	2N5664	2N5665	2N5666	2N5667
Collector-Base Voltage, V_{CB0}	250V	400V	250V	400V
Collector-Emitter Voltage, V_{CEO}	200V	300V	200V	300V
Emitter-Base Voltage, V_{EBO}	6V	6V	6V	6V
D.C. Collector Current, I_C	5A	5A	5A	5A
Peak Collector Current, I_C	10A	10A	10A	10A
Power Dissipation				
25°C Ambient	2.5W	2.5W	1.2W	1.2W
100°C Case	30W	30W	15W	15W
Operating and Storage Temperature Range	-65°C to 200°C			

MECHANICAL SPECIFICATIONS

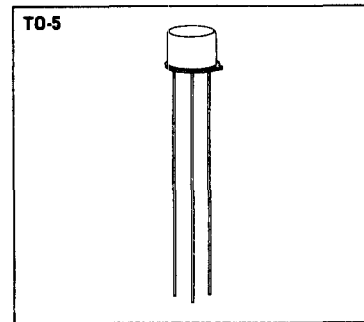
JAN, JANTX, & JANTXV 2N5664 JAN, JANTX, & JANTXV 2N5665

	INCHES	MILLIMETERS
A	.620 MAX.	15.75 MAX.
B	.050 - .075	1.27 - 1.90
C	.250 - .340	6.35 - 8.63
D	.360 MIN.	9.14 MIN.
E	.028 - .034 DIA.	.711 - .863
F	.958 - .962	24.33 - 24.43
G	.570 - .590	14.47 - 14.98
H	.145 MAX. RAD.	3.68 MAX. RAD.
J	.142 - .152 DIA.	3.60 - 3.86 DIA.
K	.350 MAX. RAD.	8.89 MAX. RAD.
L	.190 - .210	4.82 - 5.33
M	.093 - .107	2.36 - 2.72



JAN, JANTX, & JANTXV 2N5666 JAN, JANTX, & JANTXV 2N5667

	INCHES	MILLIMETERS
A	.335 - .370	8.51 - 9.40
B	.305 - .335	7.76 - 8.51
C	.240 - .260	6.09 - 6.60
D	1.5 MIN.	38.10 MIN.
E	.010 - .030	254 - 762
F	.017 ± .002 .001	432 ± .051 .025
G	.200	5.08
H	.100	2.54
J	.031 ± .003	787 ± .076
K	.029 - .045	736 - 1.14
L	.100	2.54



ELECTRICAL SPECIFICATIONS (at 25°C unless noted)
2N5664, 2N5666

Test	Symbol	Min.	Max.	Units	/455 Sub group	MIL-STD-750		
						Method	Test conditions	
Visual and mechanical					A-1	2071	See Mechanical Data	
25°C								
Collector-Emitter Breakdown Voltage (Note 1)	BV_{CE}^*	250	—	Vdc	A-2	3011	$I_C = 10\text{mA}$; $R_{BE} = 100\Omega$; Cond. B	
Collector-Emitter Breakdown Voltage (Note 1)	BV_{CEO}^*	200	—	Vdc	A-2	3011	$I_C = 10\text{mA}$; Cond. D	
Emitter-Base Breakdown Voltage	BV_{EBO}^*	6.0	—	Vdc	A-2	3026	$I_E = 10\mu\text{A}$; Cond. D	
Collector-Emitter Cutoff Current	I_{CES}^*	—	0.2	μA	A-2	3041	$V_{CE} = 200\text{Vdc}$; Cond. C	
Collector-Base Cutoff Current	I_{CBO}	—	0.1	μA	A-2	3036	$V_{CB} = 200\text{Vdc}$; Cond. D	
Collector-Base Cutoff Current	I_{CBO}	—	1.0	mA	A-2	3036	$V_{CB} = 250\text{Vdc}$; Cond. D	
D.C. Current Gain (Note 1)	h_{FE}^*	40	—	—	A-3	3076	$I_C = 0.5\text{A}$; $V_{CE} = 2\text{Vdc}$	
D.C. Current Gain (Note 1)	h_{FE}^*	40	120	—	A-3	3076	$I_C = 1\text{A}$; $V_{CE} = 5\text{Vdc}$	
D.C. Current Gain (Note 1)	h_{FE}^*	15	—	—	A-3	3076	$I_C = 3\text{A}$; $V_{CE} = 5\text{Vdc}$	
D.C. Current Gain (Note 1)	h_{FE}	5	—	—	A-3	3076	$I_C = 5\text{A}$; $V_{CE} = 5\text{Vdc}$	
Collector Saturation Voltage (Note 1)	$V_{CE}(\text{sat})^*$	—	0.4	Vdc	A-3	3071	$I_C = 3\text{A}$; $I_B = 0.3\text{A}$	
Collector Saturation Voltage (Note 1)	$V_{CE}(\text{sat})$	—	1.0	Vdc	A-3	3071	$I_C = 5\text{A}$; $I_B = 1\text{A}$	
Base Saturation Voltage (Note 1)	$V_{BE}(\text{sat})^*$	—	1.2	Vdc	A-3	3066	$I_C = 3\text{A}$; $I_B = 0.3\text{A}$; Cond. A	
Base Saturation Voltage (Note 1)	$V_{BE}(\text{sat})$	—	1.5	Vdc	A-3	3066	$I_C = 5\text{A}$; $I_B = 1\text{A}$; Cond. A	
Gain-Bandwidth Product	f_T^*	20	70	MHz	A-4	3306	$I_C = 0.5\text{A}$; $V_{CE} = 5\text{Vdc}$; $f = 10\text{MHz}$	
Output Capacitance	C_{ob}	—	120	pf	A-4	3236	$V_{CE} = 10\text{Vdc}$; $I_C = 0$; $f = 1\text{MHz}$	
Thermal Resistance	θ_{J-C}				C-1	3151		
2N5664		—	3.3	$^{\circ}\text{C}/\text{W}$				
2N5666		—	6.7	$^{\circ}\text{C}/\text{W}$				
Switching Speeds	Turn-on Time	t_{on}^*	—	0.25	μs	A-4	—	$I_C = 1\text{A}$
	Turn-off Time	t_{off}^*	—	1.5	μs	A-4	—	
100°C								
Forward Biased Second Breakdown 2N5664	$I_{S/B}$	5	—	A	B-6	3051	$V_{CE} = 6\text{Vdc}$; $t = 1\text{sec}$	
	$I_{S/B}$	0.75	—	A	B-6	3051	$V_{CE} = 40\text{Vdc}$; $t = 1\text{sec}$	
2N5666	$I_{S/B}$	43	—	mA	B-6	3051	$V_{CE} = 200\text{Vdc}$; $t = 1\text{sec}$	
	$I_{S/B}$	5	—	A	B-7	3051	$V_{CE} = 3\text{Vdc}$; $t = 1\text{sec}$	
	$I_{S/B}$	0.4	—	A	B-7	3051	$V_{CE} = 37.5\text{Vdc}$; $t = 1\text{sec}$	
	$I_{S/B}$	27	—	mA	B-7	3051	$V_{CE} = 200\text{Vdc}$; $t = 1\text{sec}$	
Unclamped Reverse Biased Second Breakdown	$E_{S/B}$	1.25	—	mJ	B-8	3053	$I_C = 5\text{A}$; $L = 0.1\text{mH}$	
Clamped Reverse Biased Second Breakdown	$E_{S/B}$	500	—	mJ	B-9	3053	$I_C = 5\text{A}$; $L = 40\text{mH}$; $V_{CLAMP} = 200\text{V}$	
150°C								
Collector-Emitter Cutoff Current	I_{CES}^*	—	100	μA	A-5	3041	$V_{CE} = 200\text{Vdc}$; Cond. C	
-65°C								
D.C. Current Gain (Note 1)	h_{FE}	15	—	—	A-6	3076	$I_C = 1\text{A}$; $V_{CE} = 5\text{Vdc}$	



Notes:

1. Pulse width = 300 μs ; duty cycle $\leq 2\%$.

* Those parameters marked with a * are JEDEC registered and devices meeting these specifications are available as commercial 2N devices.

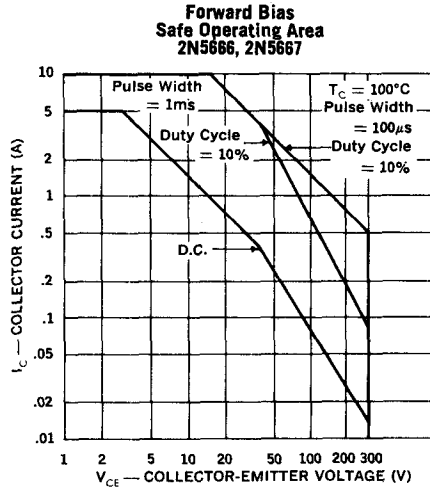
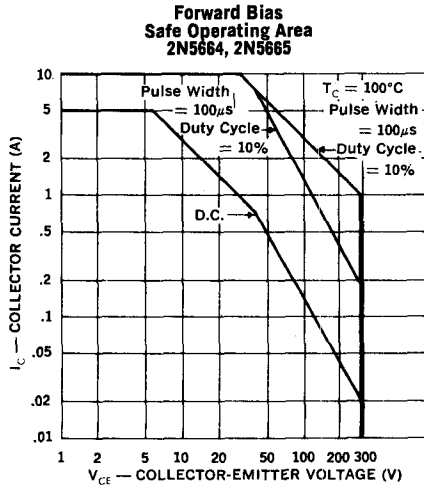
ELECTRICAL SPECIFICATIONS (at 25°C unless noted)
2N5665, 2N5667

Test	Symbol	Min.	Max.	Units	/455 Sub group	MIL-STD-750	
						Method	Test conditions
Visual and mechanical					A-1	2071	See Mechanical Data
25°C							
Collector-Emitter Breakdown Voltage (Note 1)	BV_{CE}^*	400	—	Vdc	A-2	3011	$I_C = 10\text{mAdc}$; $R_{BE} = 100\ \Omega$, Cond. B
Collector-Emitter Breakdown Voltage (Note 1)	BV_{CE0}^*	300	—	Vdc	A-2	3011	$I_C = 10\text{mAdc}$; Cond. D
Emitter-Base Breakdown Voltage	BV_{EB0}^*	6	—	Vdc	A-2	3026	$I_E = 10\ \mu\text{Adc}$; Cond. D
Collector-Emitter Cutoff Current	I_{CES}^*	—	0.2	μAdc	A-2	3041	$V_{CE} = 300\text{Vdc}$; Cond. C
Collector-Base Cutoff Current	I_{CBC}	—	0.1	μAdc	A-2	3036	$V_{CB} = 300\text{Vdc}$; Cond. D
Collector-Base Cutoff Current	I_{CBO}	—	1.0	mAdc	A-2	3036	$V_{CB} = 400\text{Vdc}$; Cond. D
D.C. Current Gain (Note 1)	h_{FE}^*	25	—	—	A-3	3076	$I_C = 0.5\text{Adc}$, $V_{CE} = 2\text{Vdc}$
D.C. Current Gain (Note 1)	h_{FE}^*	25	75	—	A-3	3076	$I_C = 1\text{Adc}$, $V_{CE} = 5\text{Vdc}$
D.C. Current Gain (Note 1)	h_{FE}^*	10	—	—	A-3	3076	$I_C = 3\text{Adc}$, $V_{CE} = 5\text{Vdc}$
D.C. Current Gain (Note 1)	h_{FE}	5	—	—	A-3	3076	$I_C = 5\text{Adc}$, $V_{CE} = 5\text{Vdc}$
Collector Saturation Voltage (Note 1)	$V_{CE}(\text{sat})^*$	—	0.4	Vdc	A-3	3071	$I_C = 3\text{Adc}$, $I_B = 0.6\text{Adc}$
Collector Saturation Voltage (Note 1)	$V_{CE}(\text{sat})$	—	1.0	Vdc	A-3	3071	$I_C = 5\text{Adc}$, $I_B = 1\text{Adc}$
Base Saturation Voltage (Note 1)	$V_{BE}(\text{sat})^*$	—	1.2	Vdc	A-3	3066	$I_C = 3\text{Adc}$, $I_B = 0.6\text{Adc}$; Cond. A
Base Saturation Voltage (Note 1)	$V_{BE}(\text{sat})$	—	1.5	Vdc	A-3	3066	$I_C = 5\text{Adc}$, $I_B = 1\text{Adc}$; Cond. A
Gain-Bandwidth Product	f_T^*	20	70	MHz	A-4	3306	$I_C = 0.5\text{Adc}$, $V_{CE} = 5\text{Vdc}$, $f = 10\text{MHz}$
Output Capacitance	C_{ob}	—	90	pf	A-4	3236	$V_{CB} = 10\text{Vdc}$, $I_E = 0$, $f = 1\text{MHz}$
Thermal Resistance	θ_{J-C}				C-1	3151	
2N5665		—	3.3	°C/W			
2N5667		—	6.7	°C/W			
Switching Speeds	Turn-on time	t_{on}^*	—	0.25	μs	A-4	—
	Turn-off time	t_{off}^*	—	2.0	μs	A-4	—
100°C							
Forward Biased Second Breakdown 2N5665	$I_{S/B}$	5	—	Adc	B-6	3051	$V_{CE} = 6\text{Vdc}$, $t = 1\text{sec}$
	$I_{S/B}$	0.75	—	Adc	B-6	3051	$V_{CE} = 40\text{Vdc}$, $t = 1\text{sec}$
	$I_{S/B}$	21	—	mAdc	B-6	3051	$V_{CE} = 300\text{Vdc}$, $t = 1\text{sec}$
2N5667	$I_{S/B}$	5	—	Adc	B-7	3051	$V_{CE} = 3\text{Vdc}$, $t = 1\text{sec}$
	$I_{S/B}$	0.4	—	Adc	B-7	3051	$V_{CE} = 37.5\text{Vdc}$, $t = 1\text{sec}$
	$I_{S/B}$	14	—	nAdc	B-7	3051	$V_{CE} = 300\text{Vdc}$, $t = 1\text{sec}$
Unclamped Reverse Biased Second Breakdown	$E_{S/B}$	1.25	—	mj	B-8	3053	$I_C = 5\text{Adc}$, $L = 0.1\text{mh}$
Clamped Reverse Biased Second Breakdown	$E_{S/B}$	500	—	mj	B-9	3053	$I_C = 5\text{Adc}$, $L = 40\text{mh}$, $V_{clamp} = 300\text{V}$
150°C							
Collector-Emitter Cutoff Current	I_{CES}^*	—	100	μAdc	A-5	3041	$V_{CE} = 300\text{Vdc}$, Cond. C
-65°C							
D.C. Current Gain (Note 1)	h_{FE}	10	—	—	A-6	3076	$I_C = 1\text{Adc}$, $V_{CE} = 5\text{Vdc}$

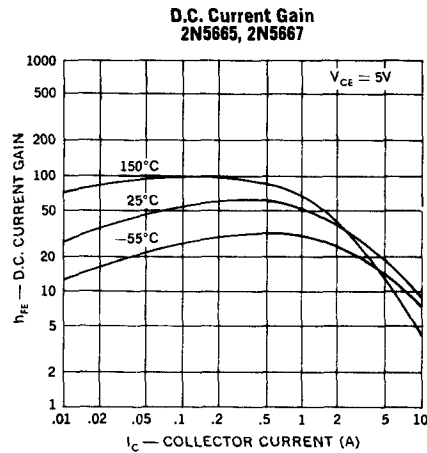
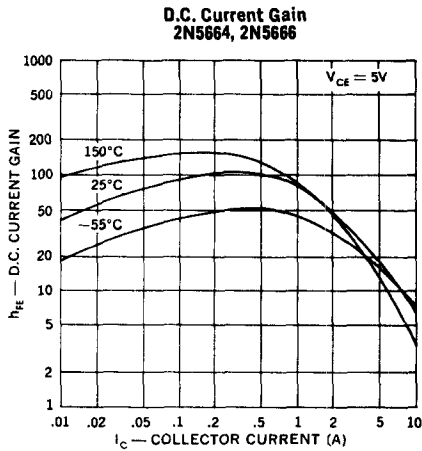
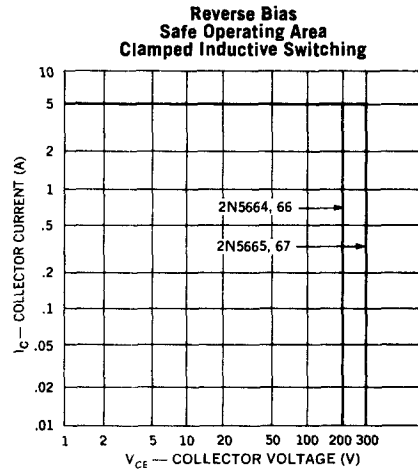
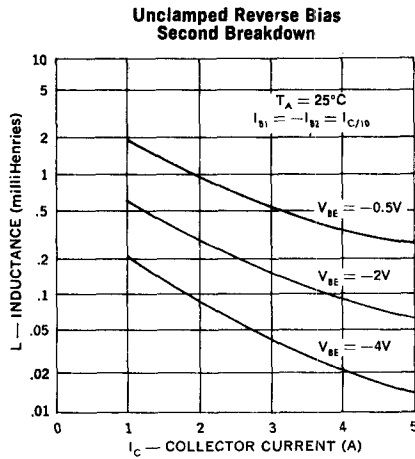
Notes:

1. Pulse width = 300 μs ; duty cycle $\leq 2\%$.

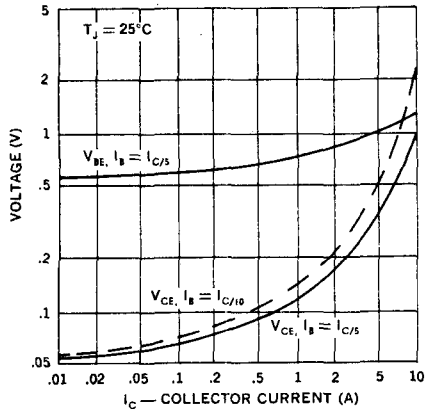
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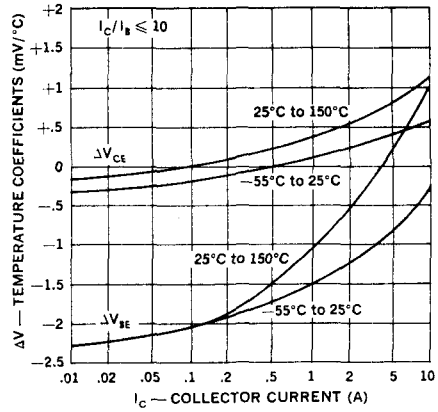
IV



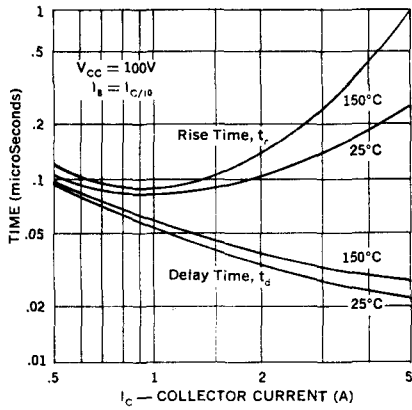
Saturation Voltages



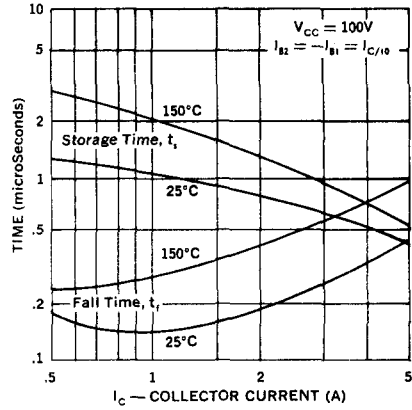
Saturation Voltage Temperature Coefficients



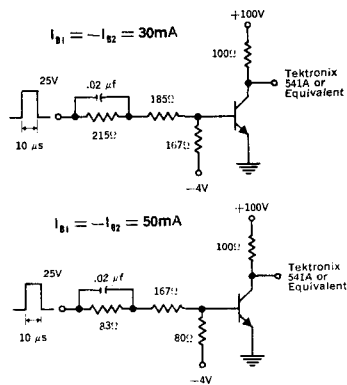
Switching Speed Characteristics



Switching Speed Characteristics



Switching Speed Circuits



Thermal Response

