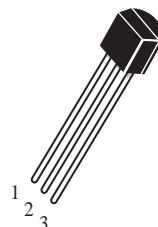


## NPN Transistors

 Lead(Pb)-Free

**TO-92**

1. EMITTER  
 2. COLLECTOR  
 3. BASE



### ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Rating	Symbol	2SD16116	2SD1616A	Unit
Collector-Emitter Voltage	V <sub>CEO</sub>	50	60	V <sub>dc</sub>
Collector-Base Voltage	V <sub>CBO</sub>	60	120	V <sub>dc</sub>
Emitter-Base Voltage	V <sub>EBO</sub>	6.0		V <sub>dc</sub>
Collector Current	I <sub>C</sub>	1.0		A <sub>dc</sub>
Total Device Dissipation T <sub>A</sub> =25°C	P <sub>D</sub>	0.75		W
Junction Temperature	T <sub>j</sub>	150		°C
Storage, Temperature	T <sub>stg</sub>	-55 to +150		°C

### ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Min	Max	Unit
Collector-Emitter Breakdown Voltage (I <sub>C</sub> = 2.0 mA <sub>dc</sub> , I <sub>B</sub> =0)	V <sub>(BR)CEO</sub>	50 60	-	V <sub>dc</sub>
Collector-Base Breakdown Voltage (I <sub>C</sub> = 10 uA <sub>dc</sub> , I <sub>E</sub> =0)	V <sub>(BR)CBO</sub>	60 120	-	V <sub>dc</sub>
Emitter-Base Breakdown Voltage (I <sub>E</sub> = 10 uA <sub>dc</sub> , I <sub>C</sub> =0)	V <sub>(BR)EBO</sub>	6.0	-	V <sub>dc</sub>
Collector Cutoff Current (V <sub>CB</sub> =60 V <sub>dc</sub> , I <sub>E</sub> =0)	I <sub>CBO</sub>	-	0.1	uA <sub>dc</sub>
Emitter Cutoff Current (V <sub>EB</sub> = 6.0 V <sub>dc</sub> , I <sub>C</sub> =0)	I <sub>EBO</sub>	-	0.1	uA <sub>dc</sub>

**2SD1616**  
**2SD1616A** **WEITRON****ELECTRICAL CHARACTERISTICS** ( $T_A=25^\circ\text{C}$  unless otherwise noted) (Continued)

Characteristics	Symbol	Min	TYP	Max	Unit
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**ON CHARACTERISTICS**

DC Current Gain ( $I_C=100\text{ mAdc}, V_{CE}=2.0\text{ Vdc}$ )	$h_{FE(1)}$	135	-	600	-
DC Current Gain ( $I_C=1.0\text{ mAdc}, V_{CE}=2.0\text{ Vdc}$ )	$h_{FE(2)}$	81	-	-	-
Collector-Emitter Saturation Voltage <sup>(1)</sup> ( $I_C=1.0\text{ mAdc}, I_B=50\text{ mAdc}$ )	$V_{CE(sat)}$	-	0.15	0.3	Vdc
Base-Emitter Saturation Voltage (1) ( $I_C=1.0\text{ mAdc}, I_B=50\text{ mAdc}$ )	$V_{BE(sat)}$	-	0.9	1.2	Vdc
Base-Emitter on Voltage (1) ( $I_C=50\text{ mA}, V_{CE}=2.0\text{ V}$ )	$V_{BE(on)}$	-	0.64	0.7	Vdc
Current-Gain-Bandwidth Product ( $I_C=100\text{ mAdc}, V_{CE}=2.0\text{ Vdc}, f=30\text{ MHz}$ )	$f_T$	100	160	-	MHz
Output Capacitance ( $V_{CB}=10\text{ V}, I_E=0\text{ V}, f=1\text{ MHz}$ )	Cob	-	-	25	PF

**SWITCHING CHARACTERISTICS**

Turn-On Time	$V_{CC}=10\text{ V}, I_C=100\text{ mA}$ $I_{B1}=-I_{B2}=10\text{ mA}$ $V_{BE(OFF)}=2-3\text{ V}$	ton	-	0.07	-	us
Storage Time		ts	-	0.95	-	
Fall Time		tf	-	0.07	-	

Note:

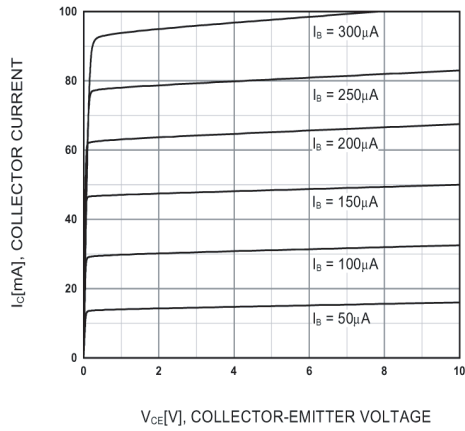
1. Pulse Test: Pulse Width 350 us, Duty Cycle 2%.

**Classification of  $h_{FE(1)}$** 

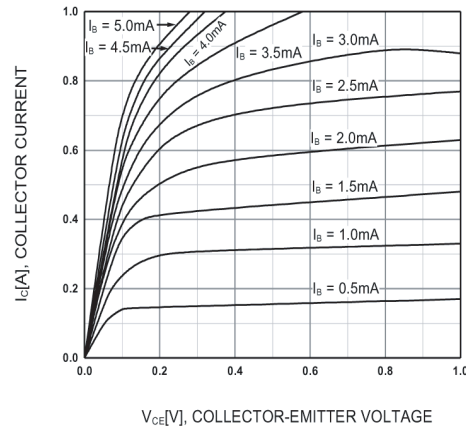
Rank	L	K	U
Range	135-270	200-400	300-600

**WEITRON**<http://www.weitron.com.tw>

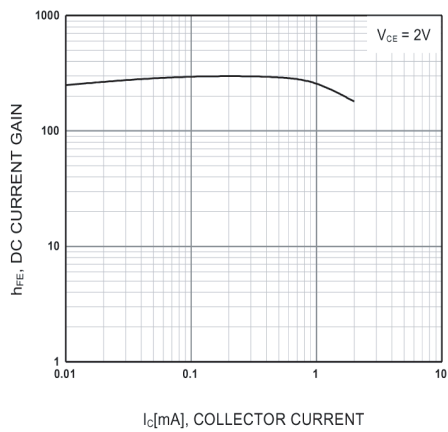
**Typical Characteristics**



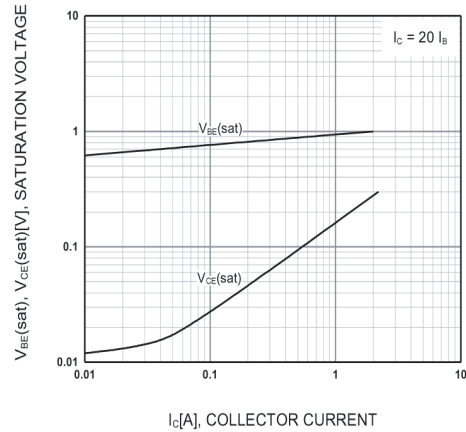
**Figure 1. Static Characteristic**



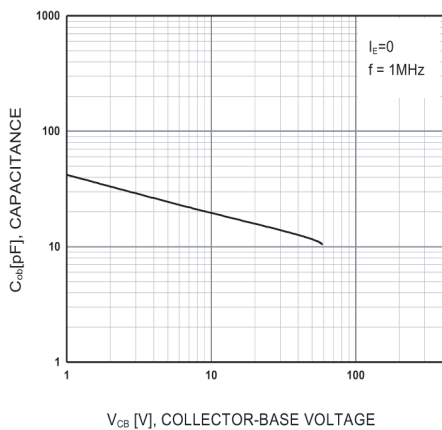
**Figure 2. Static Characteristic**



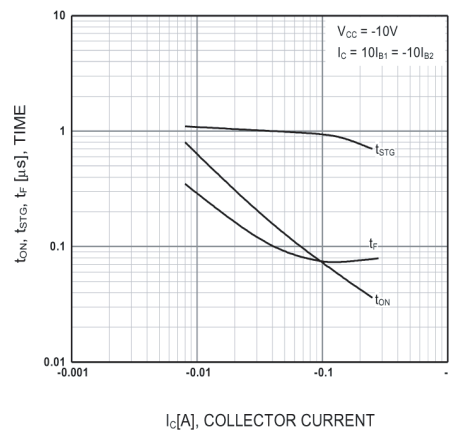
**Figure 3. DC current Gain**



**Figure 4. Base-Emitter Saturation Voltage  
Collector-Emitter Saturation Voltage**

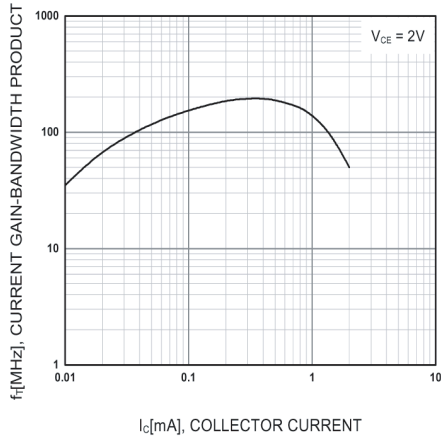


**Figure 5. Collector Output Capacitance**

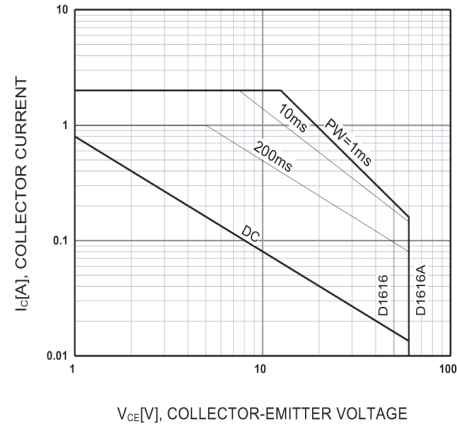


**Figure 6. Switching Time**

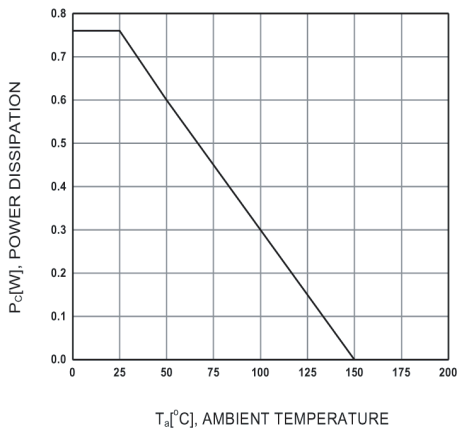
**Typical Characteristics**



**Figure 7. Current Gain Bandwidth Product**



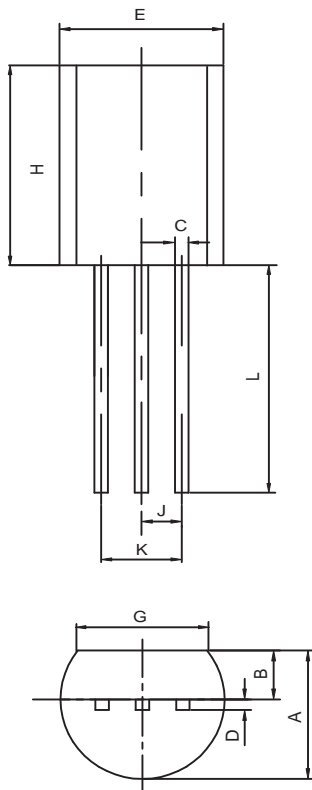
**Figure 8. Safe Operating Area**



**Figure 9. Power Derating**

**TO-92 Outline Dimensions**

unit:mm



<b>TO-92</b>		
<b>Dim</b>	<b>Min</b>	<b>Max</b>
<b>A</b>	3.30	3.70
<b>B</b>	1.10	1.40
<b>C</b>	0.38	0.55
<b>D</b>	0.36	0.51
<b>E</b>	4.40	4.70
<b>G</b>	3.43	-
<b>H</b>	4.30	4.70
<b>J</b>	1.270TYP	
<b>K</b>	2.44	2.64
<b>L</b>	14.10	14.50