

### NPN+PNP Dual General Purpose Transistors

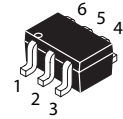
**(Pb)** Lead(Pb)-Free

#### Features:

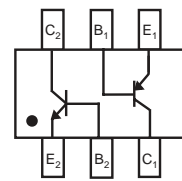
- \* Complementary Pair
- \* Epitaxial Planar Die Construction
- \* Ultra-Small Surface Mount Package
- \* One 2222A Type (NPN), One 2907A Type (PNP)
- \* Ideal for Low Power Amplification and Switching

#### Mechanical Data:

- \* Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- \* Moisture Sensitivity: Level 1 per J-STD-020C
- \* Terminals: Solderable per MIL-STD-202, Method 208
- \* Weight: 0.006 grams (approximate)



**SOT-363(SC-88)**



**NPN+PNP**

E1, B1, and C1 = 2907A  
E2, B2, and C2 = 2222A

### Maximum Ratings

Rating	Symbol	NPN 2222A	PNP 2907A	Unit
Collector-Base Voltage	$V_{CB0}$	75	-60	V
Collector-Emitter Voltage	$V_{CE0}$	40	-60	V
Emitter-Base Voltage	$V_{EB0}$	6.0	5.0	V
Collector Current-Continuous	$I_C$	600	-600	mA

### Thermal Characteristics

Characteristics	Symbol	Max	Unit
Collector Power Dissipation	$P_D$	200	mW
Junction Temperature Range	$T_j$	+150	°C
Storage Temperature Range	$T_{stg}$	-55 to +150	°C

### Device Marking

MMDT2227DW=K27

## Electrical Characteristics (T<sub>A</sub>=25°C Unless Otherwise noted)

Characteristics	Symbol	Min	Typ	Max	Unit
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### Off Characteristics

Emitter-Base Breakdown Voltage I <sub>C</sub> =10μA, I <sub>E</sub> =0 I <sub>C</sub> =-10μA, I <sub>E</sub> =0	2222A NPN 2907A PNP	V <sub>(BR)CBO</sub>	75 -60	- -	- -	V
Collector-Emitter Breakdown Voltage I <sub>C</sub> =10mA, I <sub>B</sub> =0 I <sub>C</sub> =-10mA, I <sub>B</sub> =0	2222A NPN 2907A PNP	V <sub>(BR)CES</sub>	40 -60	- -	- -	V
Emitter-Base Breakdown Voltage I <sub>E</sub> =10μA, I <sub>C</sub> =0 I <sub>E</sub> =-10μA, I <sub>C</sub> =0	2222A NPN 2907A PNP	V <sub>(BR)EBO</sub>	6.0 -5.0	- -	- -	V
Collector Cutoff Current V <sub>CB</sub> =60V, I <sub>E</sub> =0 V <sub>CB</sub> =-50V, I <sub>E</sub> =0	2222A NPN 2907A PNP	I <sub>CBO</sub>	- -	- -	10 -10	nA
Collector Cutoff Current V <sub>CE</sub> =60V, V <sub>EB(off)</sub> =3V V <sub>CE</sub> =-30V, V <sub>EB(off)</sub> =-0.5V	2222A NPN 2907A PNP	I <sub>CEX</sub>	- -	- -	10 -50	nA
Emitter Cutoff Current V <sub>EB</sub> =3V, I <sub>C</sub> =0 V <sub>EB</sub> =-3V, I <sub>C</sub> =0	2222A NPN 2907A PNP	I <sub>EBO</sub>	- -	- -	10 -10	nA

### On Characteristics

DC Current Gain V <sub>CE</sub> = 10V, I <sub>C</sub> = 0.1mA V <sub>CE</sub> = -10V, I <sub>C</sub> = -0.1mA	2222A NPN 2907A PNP	h <sub>FE1</sub>	35 75	- -	- -	
V <sub>CE</sub> = 10V, I <sub>C</sub> = 1mA V <sub>CE</sub> = -10V, I <sub>C</sub> = -1mA	2222A NPN 2907A PNP	h <sub>FE2</sub>	50 100	- -	- -	
V <sub>CE</sub> = 10V, I <sub>C</sub> = 10mA V <sub>CE</sub> = -10V, I <sub>C</sub> = -10mA	2222A NPN 2907A PNP	h <sub>FE3</sub>	75 100	- -	- -	
V <sub>CE</sub> = 10V, I <sub>C</sub> = 150mA V <sub>CE</sub> = -10V, I <sub>C</sub> = -150mA	2222A NPN 2907A PNP	h <sub>FE4</sub>	100 100	300 300	- -	
V <sub>CE</sub> = 10V, I <sub>C</sub> = 500mA V <sub>CE</sub> = -10V, I <sub>C</sub> = -500mA	2222A NPN 2907A PNP	h <sub>FE5</sub>	40 50	- -	- -	
V <sub>CE</sub> = 1V, I <sub>C</sub> = 150mA	2222A NPN	h <sub>FE6</sub>	35	-	-	

## Electrical Characteristics (T<sub>A</sub>=25°C Unless Otherwise noted)

Characteristics	Symbol	Min	Typ	Max	Unit
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### On Characteristics

Collector-Emitter Saturation Voltage I <sub>C</sub> = 150mA, I <sub>B</sub> = 15mA	2222A NPN	V <sub>CE(sat1)</sub>	-	-	0.3	V
I <sub>C</sub> = -150mA, I <sub>B</sub> = -15mA	2907A PNP		-	-	-0.4	
I <sub>C</sub> = 500mA, I <sub>B</sub> = 50mA	2222A NPN	V <sub>CE(sat2)</sub>	-	-	1.0	
I <sub>C</sub> = -500mA, I <sub>B</sub> = -50mA	2907A PNP		-	-	-1.6	
Base-Emitter Saturation Voltage I <sub>C</sub> = 150mA, I <sub>B</sub> = 15mA	2222A NPN	V <sub>BE(sat1)</sub>	0.6	-	1.2	V
I <sub>C</sub> = -150mA, I <sub>B</sub> = -15mA	2907A PNP		-	-	-1.3	
I <sub>C</sub> = 500mA, I <sub>B</sub> = 50mA	2222A NPN	V <sub>BE(sat2)</sub>	-	-	2.0	
I <sub>C</sub> = -500mA, I <sub>B</sub> = -50mA	2907A PNP		-	-	-2.6	

### Small-Signal Characteristics

Current-Gain-Bandwidth Product V <sub>CE</sub> = 20V, I <sub>C</sub> = 20mA, f = 100MHz	2222A NPN	f <sub>T</sub>	300	-	-	MHz
V <sub>CE</sub> = -20V, I <sub>C</sub> = -50mA, f = 100MHz	2907A PNP		200	-	-	
Output Capacitance V <sub>CB</sub> = 10V, f = 1.0MHz	2222A NPN	C <sub>ob</sub>	-	-	8	pF
V <sub>CB</sub> = -10V, f = 1.0MHz	2907A PNP		-	-	8	
Input Capacitance V <sub>EB</sub> = 0.5V, f = 1.0MHz	2222A NPN	C <sub>ib</sub>	-	-	25	pF
V <sub>EB</sub> = -2.0V, f = 1.0MHz	2907A PNP		-	-	30	
Noise Figure V <sub>CE</sub> = 10V, I <sub>C</sub> = 0.1mA, f = 1.0kHz, R <sub>S</sub> = 1KΩ		NF	-	-	4	dB

### Switching Characteristics

Delay Time V <sub>CC</sub> = 30V, I <sub>C</sub> = 150mA, V <sub>BE(off)</sub> = 0.5V, I <sub>B1</sub> = 15mA	2222A NPN	t <sub>d</sub>	-	-	10	pF
V <sub>CC</sub> = -30V, I <sub>C</sub> = -150mA, I <sub>B1</sub> = -15mA	2907A PNP		-	-	10	
Rise Time V <sub>CC</sub> = 30V, I <sub>C</sub> = 150mA, V <sub>BE(off)</sub> = 0.5V, I <sub>B1</sub> = 15mA	2222A NPN	t <sub>r</sub>	-	-	25	nS
V <sub>CC</sub> = -30V, I <sub>C</sub> = -150mA, I <sub>B1</sub> = -15mA	2907A PNP		-	-	40	
Storage Time V <sub>CC</sub> = 30V, I <sub>C</sub> = 150mA, V <sub>BE(off)</sub> = 0.5V, I <sub>B1</sub> = 15mA	2222A NPN	t <sub>s</sub>	-	-	225	nS
V <sub>CC</sub> = -30V, I <sub>C</sub> = -150mA, I <sub>B1</sub> = -15mA	2907A PNP		-	-	225	
Fall Time V <sub>CC</sub> = 30V, I <sub>C</sub> = 150mA, V <sub>BE(off)</sub> = 0.5V, I <sub>B1</sub> = 15mA	2222A NPN	t <sub>f</sub>	-	-	60	nS
V <sub>CC</sub> = -30V, I <sub>C</sub> = -150mA, I <sub>B1</sub> = -15mA	2907A PNP		-	-	60	

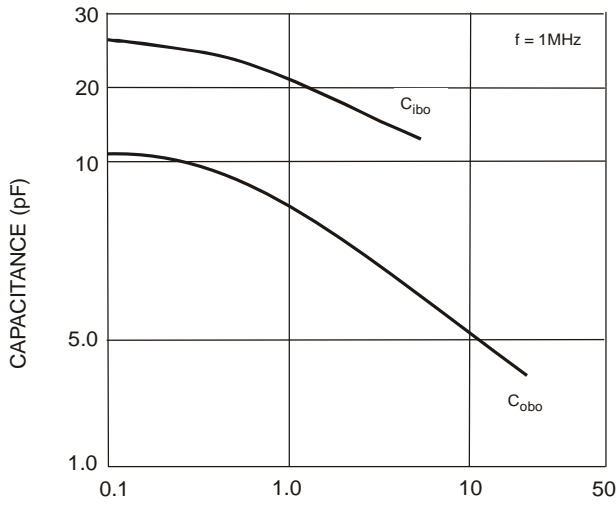


Fig. 1 (2222A) Typical Capacitance

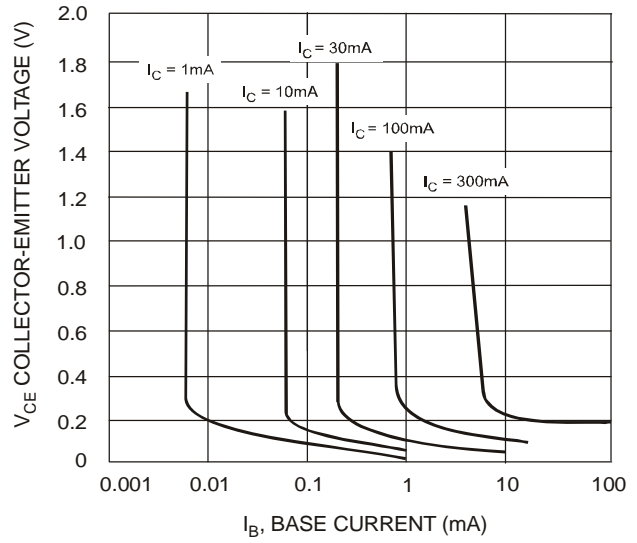


Fig. 2 (2222A) Typical Collector Saturation Region

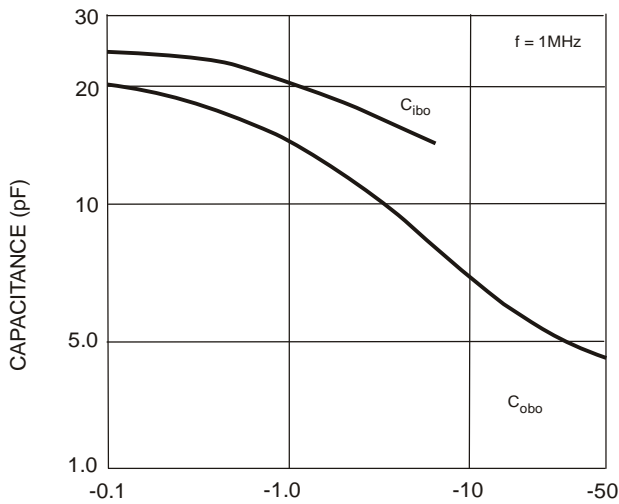


Fig. 1 (2907A) Typical Capacitance

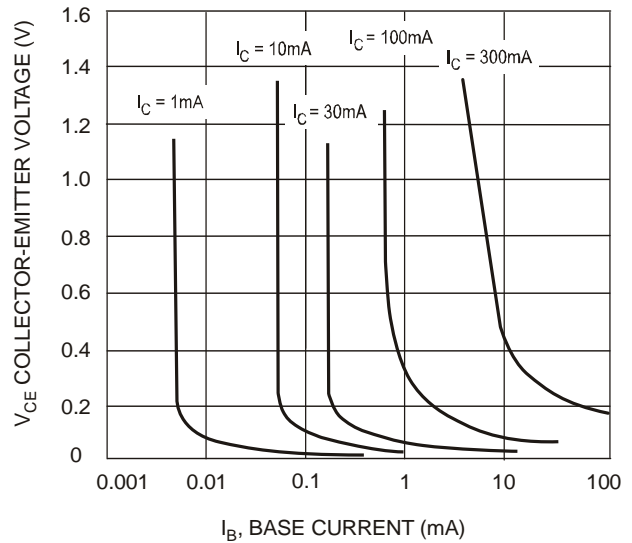
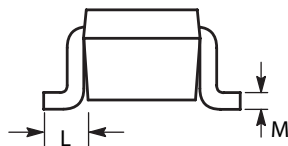
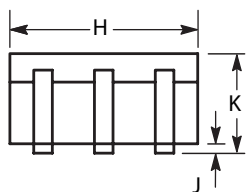
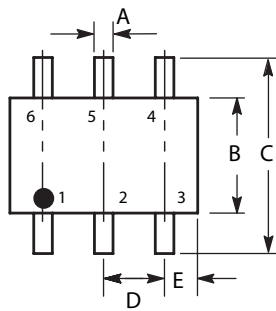


Fig. 4 (2907A) Typical Collector Saturation Region

SOT-363 Package Outline Dimensions

Unit:mm



SOT-363		
Dim	Min	Max
A	0.10	0.30
B	1.15	1.35
C	2.00	2.20
D	0.65 REF	
E	0.30	0.40
H	1.80	2.20
J	-	0.10
K	0.80	1.10
L	0.25	0.40
M	0.10	0.25

