# MMDT2227

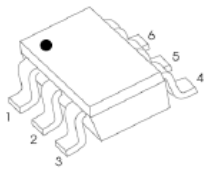
**Plastic-Encapsulate Transistors**

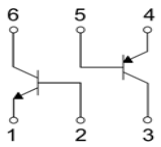
DUAL TRANSISTOR (NPN+PNP)

## FEATURE

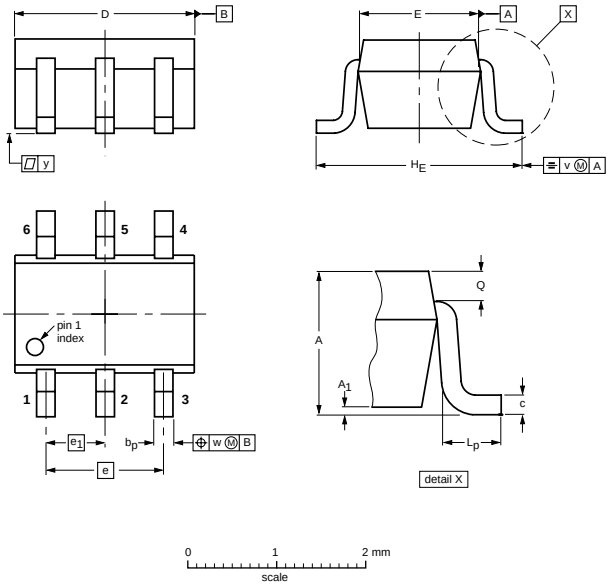
- Epitaxial planar die construction
- One 2222A NPN
  One 2907A PNP
- Ideal for power amplification and switching

**MARKING: K27**






## SOT-363




DIMENSIONS (mm are the original dimensions)

| UNIT | A | $A_1$ max | $b_p$ | c | D | E | e | $e_1$ | $H_E$ | $L_p$ | Q | v | w | y |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.1<br>0.8 | 0.1 | 0.30<br>0.20 | 0.25<br>0.10 | 2.2<br>1.8 | 1.35<br>1.15 | 1.3 | 0.65 | 2.2<br>2.0 | 0.45<br>0.15 | 0.25<br>0.15 | 0.2 | 0.2 | 0.1 |

## NPN 2222A

## MAXIMUM RATINGS ($T_a$=25℃ unless otherwise noted)

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| $V_{CBO}$ | Collector-Base Voltage | 75 | V |
| $V_{CEO}$ | Collector-Emitter Voltage | 40 | V |
| $V_{EBO}$ | Emitter-Base Voltage | 6 | V |
| $I_C$ | Collector Current -Continuous | 600 | mA |
| $P_C$ | Collector Power Dissipation | 200 | mW |
| $T_J$ | Junction Temperature | 150 | ℃ |
| $T_{stg}$ | Storage Temperature | -55-150 | ℃ |

# MMDT2227

## ELECTRICAL CHARACTERISTICS ($T_a$=25℃ unless otherwise specified)

| Parameter | Symbol | Test conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| **Collector-base breakdown voltage** | $V_{(BR)CBO}$ | $I_C$= 10μA, $I_E$=0 | 75 | | V |
| **Collector-emitter breakdown voltage** | $V_{(BR)CEO}$ | $I_C$= 10mA, $I_B$=0 | 40 | | V |
| **Emitter-base breakdown voltage** | $V_{(BR)EBO}$ | $I_E$=10μA.$I_C$=0 | 6 | | V |
| **Collector cut-off current** | $I_{CBO}$ | $V_{CB}$= 60V, $I_E$=0 | | 10 | nA |
| **Collector cut-off current** | $I_{CEX}$ | $V_{CE}$= 60V,$V_{EB(off)}$=3V | | 10 | nA |
| **Emitter cut-off current** | $I_{EBO}$ | $V_{EB}$= 3 V, $I_C$=0 | | 10 | nA |
| **DC current gain** | $h_{FE(1)}$* | $V_{CE}$=10V, $I_C$= 0.1mA | 35 | | |
| | $h_{FE(2)}$* | $V_{CE}$=10V, $I_C$= 1mA | 50 | | |
| | $h_{FE(3)}$* | $V_{CE}$=10V, $I_C$= 10mA | 75 | | |
| | $h_{FE(4)}$* | $V_{CE}$=10V, $I_C$= 150mA | 100 | 300 | |
| | $h_{FE(5)}$* | $V_{CE}$=10V, $I_C$= 500mA | 40 | | |
| | $h_{FE(6)}$* | $V_{CE}$=1V, $I_C$= 150mA | 35 | | |
| **Collector-emitter saturation voltage** | $V_{CE(sat)1}$* | $I_C$=150mA, $I_B$= 15mA | | 0.3 | V |
| | $V_{CE(sat)2}$* | $I_C$=500mA, $I_B$= 50mA | | 1 | V |
| **Base-emitter saturation voltage** | $V_{BE(sat)1}$* | $I_C$=150mA, $I_B$=15mA | 0.6 | 1.2 | V |
| | $V_{BE(sat)2}$* | $I_C$=500mA, $I_B$= 50mA | | 2 | V |
| **Transition frequency** | $f_T$ | $V_{CE}$=20V, $I_C$= 20mA, f=100MHz | 300 | | MHz |
| **Output Capacitance** | $C_{ob}$ | $V_{CB}$=10V, $I_E$=0,f=1MHz | | 8 | pF |
| **Input Capacitance** | $C_{ib}$ | $V_{EB}$=0.5V,$I_C$= 0,f=1MHz | | 25 | pF |
| **Noise Figure** | NF | $V_{CE}$=10V, $I_C$=100μA, f=1KHz,Rs=1KΩ | | 4 | dB |

*pulse test

### Switching characteristics

| Parameter | Symbol | Test conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| **Delay time** | $t_d$ | $V_{CC}$=30V, $I_C$=150mA, $V_{BE(off)}$=0.5V,$I_{B1}$=15mA | | 10 | ns |
| **Rise time** | $t_r$ | | | 25 | ns |
| **Storage time** | $t_S$ | | | 225 | ns |
| **Fall time** | $t_f$ | | | 60 | ns |

# MMDT2227

**PNP 2907A**

**MAXIMUM RATINGS ($T_a$=25℃ unless otherwise noted)**

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| $V_{CBO}$ | Collector-Base Voltage | -60 | V |
| $V_{CEO}$ | Collector-Emitter Voltage | -60 | V |
| $V_{EBO}$ | Emitter-Base Voltage | -5 | V |
| $I_C$ | Collector Current -Continuous | -600 | mA |
| $P_C$ | Collector Power Dissipation | 200 | mW |
| $T_J$ | Junction Temperature | 150 | ℃ |
| $T_{stg}$ | Storage Temperature | -55-150 | ℃ |

**ELECTRICAL CHARACTERISTICS ($T_a$=25℃ unless otherwise specified)**

| Parameter | Symbol | Test conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| **Collector-base breakdown voltage** | $V_{(BR)CBO}$ | $I_C$= -10μA, $I_E$=0 | -60 | | V |
| **Collector-emitter breakdown voltage** | $V_{(BR)CEO}$ | $I_C$= -10mA, $I_B$=0 | -60 | | V |
| **Emitter-base breakdown voltage** | $V_{(BR)EBO}$ | $I_E$=-10μA, $I_C$=0 | -5 | | V |
| **Collector cut-off current** | $I_{CBO}$ | $V_{CB}$=-50V, $I_E$=0 | | -10 | nA |
| **Collector cut-off current** | $I_{CEX}$ | $V_{CE}$=-30V,$V_{EB(off)}$=-0.5V | | -50 | nA |
| **Emitter cut-off current** | $I_{EBO}$ | $V_{EB}$=-3V, $I_C$=0 | | -10 | nA |
| **DC current gain** | $h_{FE(1)}$* | $V_{CE}$=-10V, $I_C$= -0.1mA | 75 | | |
| | $h_{FE(2)}$* | $V_{CE}$=-10V, $I_C$= -1mA | 100 | | |
| | $h_{FE(3)}$* | $V_{CE}$=-10V, $I_C$=-10mA | 100 | | |
| | $h_{FE(4)}$* | $V_{CE}$=-10V, $I_C$= -150mA | 100 | 300 | |
| | $h_{FE(5)}$* | $V_{CE}$=-10V, $I_C$=-500mA | 50 | | |
| **Collector-emitter saturation voltage** | $V_{CE(sat)1}$* | $I_C$=-150mA, $I_B$=-15mA | | -0.4 | V |
| | $V_{CE(sat)2}$* | $I_C$=-500mA, $I_B$=- 50mA | | -1.6 | V |
| **Base-emitter saturation voltage** | $V_{BE(sat)1}$* | $I_C$=-150mA, $I_B$=-15mA | | -1.3 | V |
| | $V_{BE(sat)2}$* | $I_C$=-500mA, $I_B$= -50mA | | -2.6 | V |
| **Transition frequency** | $f_T$ | $V_{CE}$=-20V, $I_C$= -50mA,f=100MHz | 200 | | MHz |
| **Output Capacitance** | $C_{ob}$ | $V_{CB}$=-10V, $I_E$= 0,f=1MHz | | 8 | pF |
| **Input Capacitance** | $C_{ib}$ | $V_{EB}$=-2V, $I_C$= 0,f=1MHz | | 30 | pF |
| **Delay time** | $t_d$ | $V_{CC}$=-30V,$I_C$=-150mA, $I_{B1}$=-15mA | | 10 | ns |
| **Rise time** | $t_r$ | | | 40 | ns |
| **Storage time** | $t_s$ | | | 225 | ns |
| **Fall time** | $t_f$ | | | 60 | ns |

*pulse test