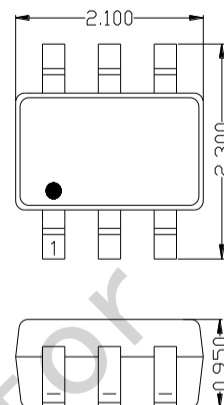
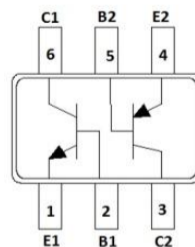


- Epoxy meets UL 94 V-0 flammability rating
- Lead Free Finish/RoHS Compliant
- For Switching and AF Amplifier Applications
- Rugged and reliable
- Device Marking Code

Equivalent Circuit



SOT-363-6L

### MAXIMUM RATINGSTR1 (NPN) (Ta = 25 °C)

| 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     |
| $P_C$     | Collector Power Dissipation | 200        | mW    |
| $I_C$     | Collector Current           | 600        | mA    |
| $T_J$     | Junction Temperature        | 150        | °C    |
| $T_{STG}$ | Storage Temperature         | -55 to 150 | °C    |

### ELECTRICAL CHARACTERISTICSOF TR1(NPN) (Ta = 25 °C)

| Symbol        | Parameter                            | Test conditions              | Min | Typ | Max | Unit |
|---------------|--------------------------------------|------------------------------|-----|-----|-----|------|
| $V_{(BR)CBO}$ | Collector-Base Breakdown Voltage     | $I_C=10\mu A, I_E=0$         | 75  |     |     | V    |
| $V_{(BR)CEO}$ | Collector-Emitter Breakdown Voltage  | $I_C=10mA, I_B=0$            | 40  |     |     | V    |
| $V_{(BR)EBO}$ | Emitter-Base Breakdown Voltage       | $I_E=10\mu A, I_C=0$         | 6   |     |     | V    |
| $I_{CBO}$     | Collector Cut-Off Current            | $V_{CB}=60V, I_E=0$          |     |     | 10  | nA   |
| $I_{CEX}$     | Collector Cut-Off Current            | $V_{CE}=60V, V_{EB(off)}=3V$ |     |     | 10  | nA   |
| $I_{EBO}$     | Emitter-Base Cutoff Current          | $V_{EB}=3V, I_C=0$           |     |     | 10  | nA   |
| $h_{FE}$      | DC Current Gain(Note1)               | $V_{CE}=10V, I_C=0.1mA$      | 35  |     |     |      |
|               |                                      | $V_{CE}=10V, I_C=1mA$        | 50  |     |     |      |
|               |                                      | $V_{CE}=10V, I_C=10mA$       | 75  |     |     |      |
|               |                                      | $V_{CE}=10V, I_C=150mA$      | 100 |     | 300 |      |
|               |                                      | $V_{CE}=10V, I_C=500mA$      | 40  |     |     |      |
|               |                                      | $V_{CE}=1V, I_C=150mA$       | 35  |     |     |      |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C=150mA, I_B=15mA$        |     |     | 0.3 | V    |
|               |                                      | $I_C=500mA, I_B=50mA$        |     |     | 1   |      |
| $V_{BE(sat)}$ | Base-Emitter Voltage                 | $I_C=150mA, I_B=15mA$        | 0.6 |     | 1.2 | V    |
|               |                                      | $I_C=500mA, I_B=50mA$        |     |     | 2   |      |

|          |                      |                                                                      |     |  |     |     |
|----------|----------------------|----------------------------------------------------------------------|-----|--|-----|-----|
| $f_T$    | Transition Frequency | $V_{CE}=20V, I_C=20mA,$<br>$f=100MHz$                                | 300 |  |     | MHz |
| $C_{ob}$ | Output Capacitance   | $V_{CB}=10V, I_E=0,$<br>$f=1MHz$                                     |     |  | 8   | pF  |
| $C_{ib}$ | Input Capacitance    | $V_{EB}=0.5V,$<br>$I_C=0, f=1MHz$                                    |     |  | 25  | pF  |
| NF       | Noise Figure         | $V_{CE}=10V, I_C=0.1mA,$<br>$f=1KHz, R_s=1K\Omega,$                  |     |  | 4   | dB  |
| $t_d$    | Delay Time           | $V_{CC}=30V,$<br>$I_C=150mA,$<br>$V_{BE(off)}=0.5V$<br>$I_{B1}=15mA$ |     |  | 10  | nS  |
| $t_r$    | Rise Time            |                                                                      |     |  | 25  | nS  |
| $t_s$    | Storage Time         |                                                                      |     |  | 225 | nS  |
| $t_f$    | Fall Time            |                                                                      |     |  | 60  | nS  |

Note 1: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2.0\%$  MAXIMUM

RATINGS TR2 (PNP) ( $T_a = 25^\circ C$ )

| 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          |
| $P_C$     | Collector Power Dissipation | 200        | mW         |
| $I_C$     | Collector Current           | -600       | mA         |
| $T_J$     | Junction Temperature        | 150        | $^\circ C$ |
| $T_{STG}$ | Storage Temperature         | -55 to 150 | $^\circ C$ |

#### ELECTRICAL CHARACTERISTICS OF TR2(PNP) ( $T_a = 25^\circ C$ )

| Symbol        | Parameter                            | Test conditions                  | Min | Typ | Max  | Unit |
|---------------|--------------------------------------|----------------------------------|-----|-----|------|------|
| $V_{(BR)CBO}$ | Collector-Base Breakdown Voltage     | $I_C=-10\mu A, I_E=0$            | -60 |     |      | V    |
| $V_{(BR)CEO}$ | Collector-Emitter Breakdown Voltage  | $I_C=-10mA, I_B=0$               | -60 |     |      | V    |
| $V_{(BR)EBO}$ | Emitter-Base Breakdown Voltage       | $I_E=-10\mu A, I_C=0$            | -5  |     |      | V    |
| $I_{CBO}$     | Collector Cut-Off Current            | $V_{CB}=-50V, I_E=0$             |     |     | -10  | nA   |
| $I_{CEX}$     | Collector Cut-Off Current            | $V_{CE}=-30V, V_{EB(off)}=-0.5V$ |     |     | -50  | nA   |
| $I_{EBO}$     | Emitter-Base Cutoff Current          | $V_{EB}=-3V, I_C=0$              |     |     | -10  | nA   |
| $h_{FE}$      | DC Current Gain<br>(Note1)           | $V_{CE}=-10V, I_C=-0.1mA$        | 75  |     |      |      |
|               |                                      | $V_{CE}=-10V, I_C=-1mA$          | 100 |     |      |      |
|               |                                      | $V_{CE}=-10V, I_C=-10mA$         | 100 |     |      |      |
|               |                                      | $V_{CE}=-10V, I_C=-150mA$        | 100 |     | 300  |      |
|               |                                      | $V_{CE}=-10V, I_C=-500mA$        | 50  |     |      |      |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C=-150mA, I_B=-15mA$          |     |     | -0.4 | V    |
|               |                                      | $I_C=-500mA, I_B=-50mA$          |     |     | -1.6 | V    |
| $V_{BE(sat)}$ | Base-Emitter Voltage                 | $I_C=-150mA, I_B=-15mA$          |     |     | -1.3 | V    |
|               |                                      | $I_C=-500mA, I_B=-50mA$          |     |     | -2.6 | V    |

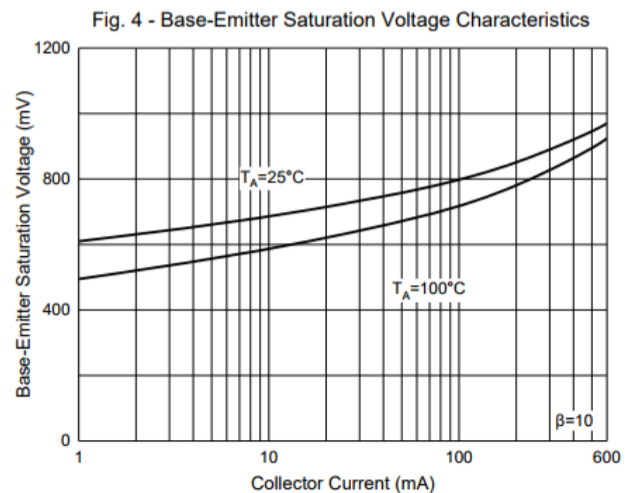
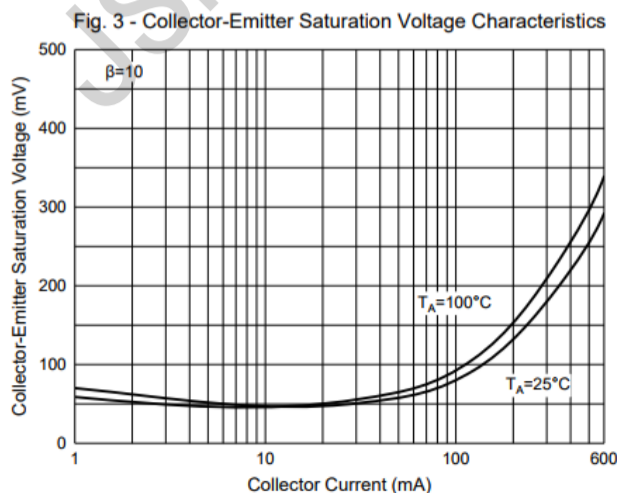
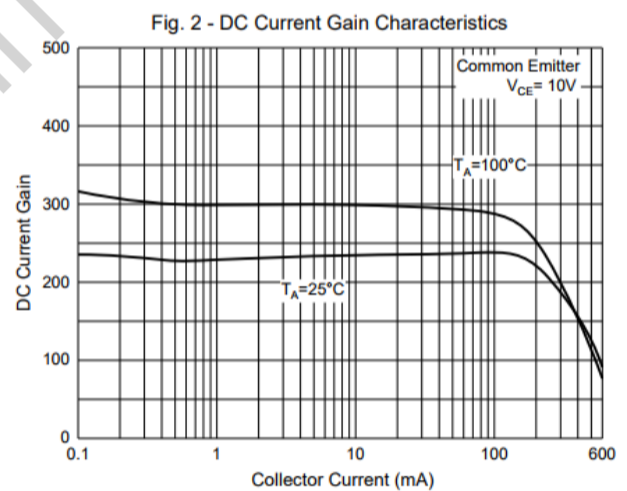
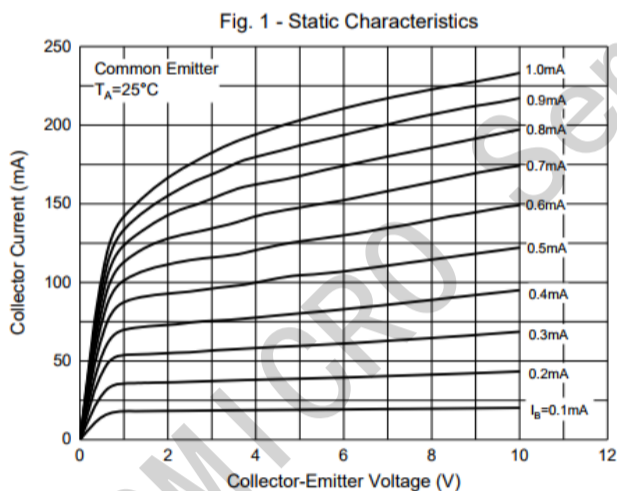
|       |                      |                                              |     |  |     |     |
|-------|----------------------|----------------------------------------------|-----|--|-----|-----|
| $f_T$ | Transition Frequency | $V_{CE}=-20V, I_C=-50mA,$<br>$f=100MHz$      | 200 |  |     | MHz |
| Cob   | Output Capacitance   | $V_{CB}=-10V,$<br>$I_E=0, f=1MHz$            |     |  | 8   | pF  |
| Cib   | Input Capacitance    | $V_{EB}=-2V,$<br>$I_C=0, f=1MHz$             |     |  | 30  | pF  |
| $t_d$ | Delay Time           | $V_{CC}=-30V, I_C=-150mA,$<br>$I_{B1}=-15mA$ |     |  | 10  | nS  |
| $t_r$ | Rise Time            |                                              |     |  | 40  | nS  |
| $t_s$ | Storage Time         |                                              |     |  | 225 | nS  |
| $t_f$ | Fall Time            |                                              |     |  | 60  | nS  |

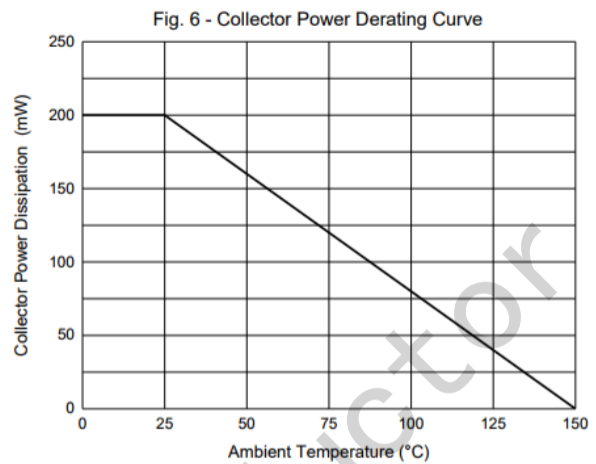
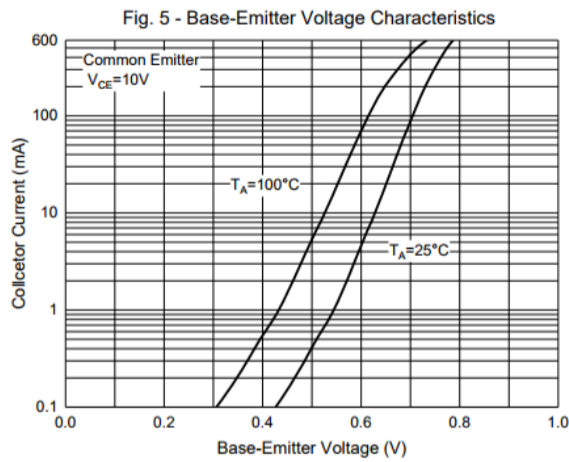
Note 1: Pluse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 20\%$

### ORDERING INFORMATION

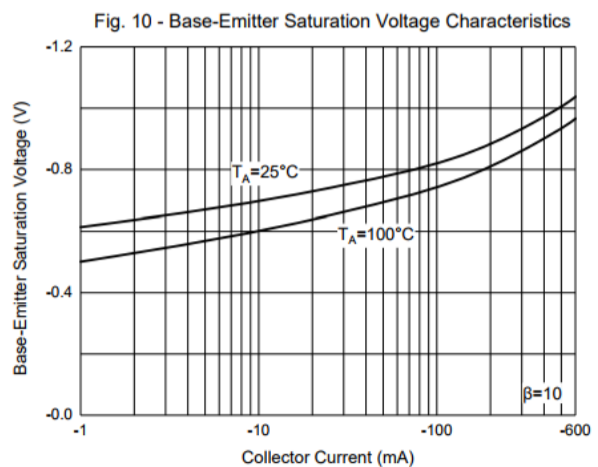
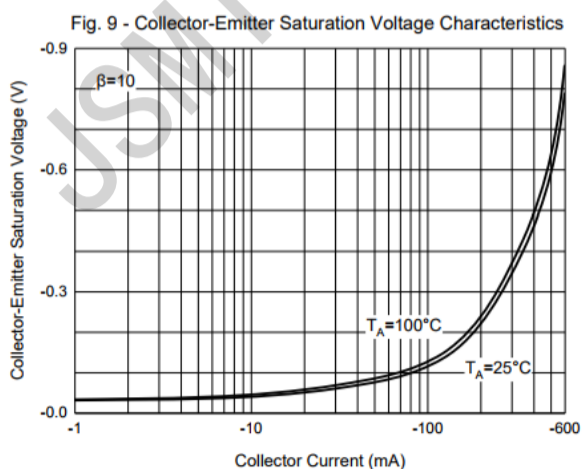
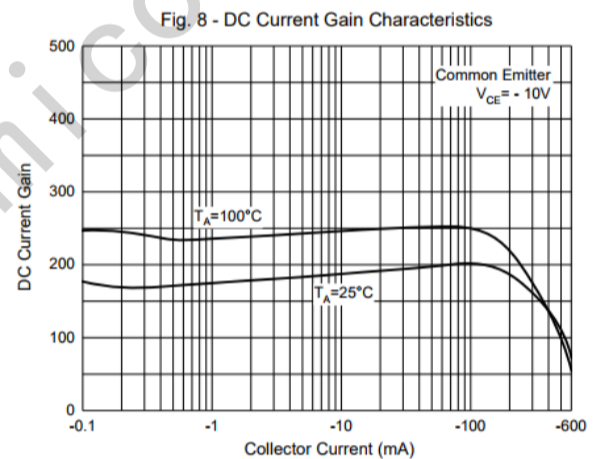
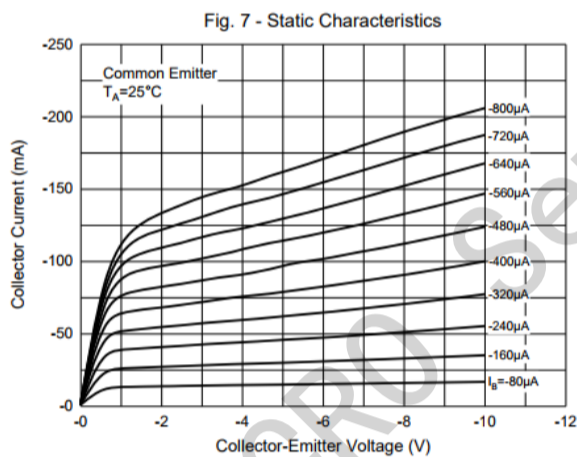
| Device   | Package   | Shipping                         | Tape wide | Emboss pitch | Tape specification | Notes |
|----------|-----------|----------------------------------|-----------|--------------|--------------------|-------|
| MMDT2227 | SOT363-6L | Tape & Reel<br>3000pcs / 7" Reel | 8mm       | 4mm          | Conductive         |       |

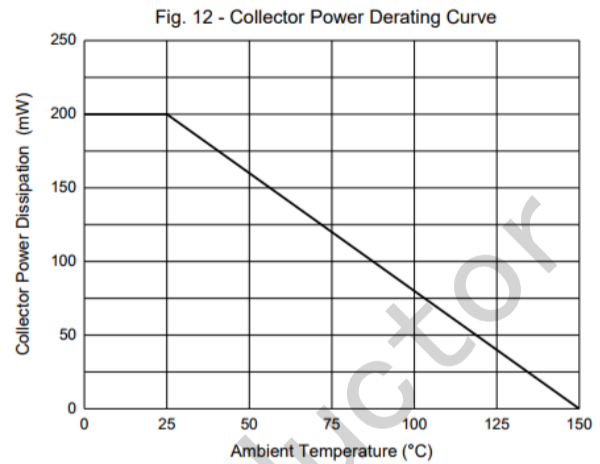
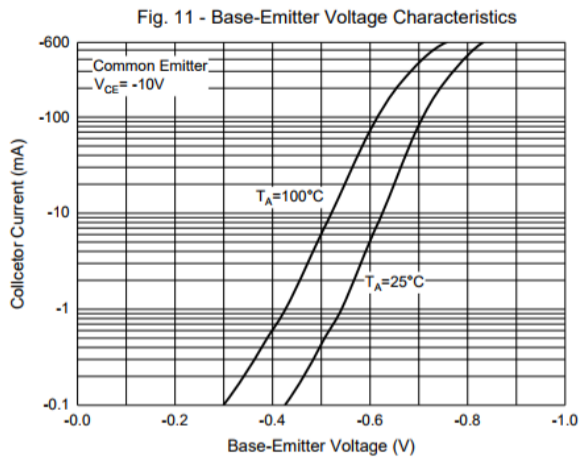
### TYPICAL Curve Characteristics (NPN Transistor)





### Curve Characteristics (PNP Transistor)

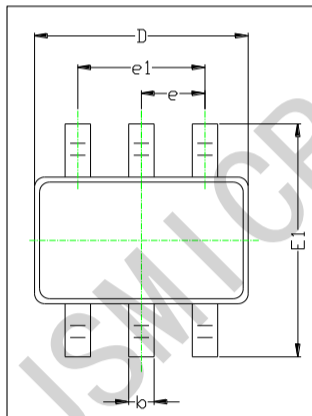




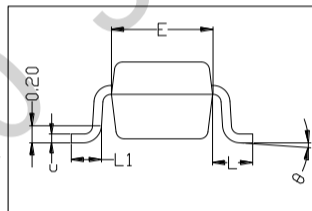
## PACKAGE DIMENSIONS

Package outline : SOT-363-6L

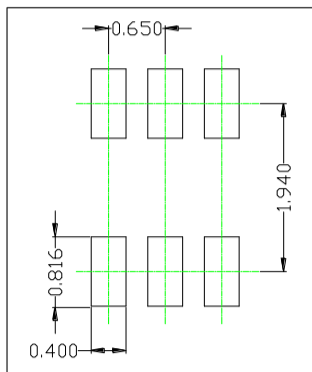
### TOP VIEW



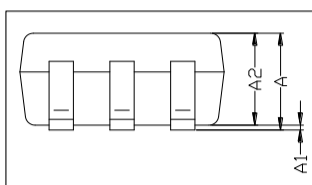
### SIDE VIEW



### SOLDERING PATTERN



### FRONT VIEW



| SYMBOL | DIMENSIONS IN MILLIMETER |       |
|--------|--------------------------|-------|
|        | MIN                      | MAX   |
| A      | 0.900                    | 1.000 |
| A1     | 0.000                    | 0.100 |
| A2     | 0.900                    | 1.000 |
| b      | 0.150                    | 0.350 |
| c      | 0.100                    | 0.150 |
| D      | 2.000                    | 2.200 |
| E      | 1.150                    | 1.350 |
| E1     | 2.150                    | 2.400 |
| e      | 0.650 TYP.               |       |
| e1     | 1.200                    | 1.400 |
| L      | 0.525 REF.               |       |
| L1     | 0.260                    | 0.460 |
| θ      | 0°                       | 8°    |

#### Notice:

1. Lead plating: Pb free solder
2. Lead thickness includes solder plating
3. Lead frame: CAC-5
4. Other Tolerance:  $\pm 0.05$
5. Unit: mm
6. Dimensions are exclusive of Burrs, Mold Flash and Tie Bar extrusions