

FMOSTHAC35P06-H

List

List.....1

Package outline.....2

Features.....2

Applications.....2

Mechanical data.....2

Maximum ratings .....2

Electrical characteristics.....3

Rating and characteristic curves.....4~5

Pinning information.....6

Marking.....6

Suggested solder pad layout.....6

Packing Information.....7

Reel Packing.....8

Suggested thermal profiles for soldering processes.....8

## FMOSTHAC35P06-H

# -35A -60V P-Channel Trench Fast Switching Power MOSFET

## Features

- $-V_{DS}=60V$ ,  $-I_D=35A$ .
- $R_{DS(ON)} \leq 25m\Omega$ , @  $-V_{GS}=10V$ ,  $-I_D=18A$ .
- $R_{DS(ON)} \leq 33m\Omega$ , @  $-V_{GS}=4.5V$ ,  $-I_D=12A$ .
- 100%  $E_{AS}$  guaranteed.
- Excellent on-resistance and gate charge.
- Excellent  $CdV/dt$  effect decline.
- Advanced high cell density trench technology.
- Lead-free parts meet RoHS requirements.
- Halogen-free (IEC61249-2-21).

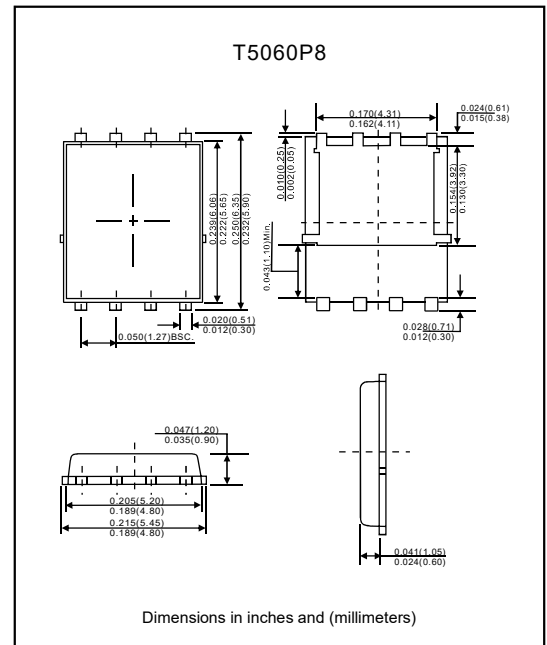
## Applications

- synchronous buck converter applications.

## Mechanical data

- Epoxy:UL94-V0 rated flame retardant.
- Case : Molded plastic,T5060P8.
- Mounting Position : Any.

## Package outline



## Maximum ratings (At $T_c=25^\circ C$ unless otherwise noted)

| Parameter                                        | Symbol          | Ratings     | Unit         |
|--------------------------------------------------|-----------------|-------------|--------------|
| Drain-source voltage                             | $-V_{DS}$       | 60          | V            |
| Gate-source voltage                              | $V_{GS}$        | $\pm 20$    | V            |
| Continuous drain current , $-V_{GS}@10V$ (Note1) | $-I_D$          | 35          | A            |
| ( $T_c=100^\circ C$ )                            |                 | 27          |              |
| Pulsed drain current (Note2)                     | $-I_{DM}$       | 70          | A            |
| Avalanche current                                | $I_{AS}$        | 47.6        | A            |
| Single pulse avalanche energy (Note3)            | $E_{AS}$        | 113         | mJ           |
| Power dissipation (Note4)                        | $P_D$           | 52.1        | W            |
| Thermal resistance Junction to ambient (Note1)   | $R_{\theta JA}$ | 62          | $^\circ C/W$ |
| Thermal resistance Junction to case (Note1)      | $R_{\theta JC}$ | 2.4         | $^\circ C/W$ |
| Operating Junction temperature                   | $T_J$           | +150        | $^\circ C$   |
| Storage temperature range                        | $T_{STG}$       | -55 to +150 | $^\circ C$   |

## FMOSTHAC35P06-H

Electrical characteristics (At  $T_J=25^{\circ}\text{C}$  unless otherwise noted)

| Parameter                                      | Symbol        | Conditions                                         | Min. | Typ. | Max.      | Unit       |
|------------------------------------------------|---------------|----------------------------------------------------|------|------|-----------|------------|
| Off characteristics                            |               |                                                    |      |      |           |            |
| Drain-source breakdown voltage                 | $-BV_{DSS}$   | $-I_D=250\mu A, V_{GS}=0V$                         | 60   |      |           | V          |
| Drain-source leakage current                   | $-I_{DSS}$    | $-V_{DS}=48V, V_{GS}=0V$                           |      |      | 1         | $\mu A$    |
|                                                |               | $-V_{DS}=48V, V_{GS}=0V, T_J=55^{\circ}C$          |      |      | 5         |            |
| Gate-source leakage current                    | $I_{GSS}$     | $V_{GS}=\pm 20V, V_{DS}=0V$                        |      |      | $\pm 100$ | nA         |
| On characteristics                             |               |                                                    |      |      |           |            |
| Gate threshold voltage                         | $-V_{GS(TH)}$ | $V_{GS}=V_{DS}, -I_D=250\mu A$                     | 1    |      | 2.5       | V          |
| Static drain-source on-resistance (Note 2)     | $R_{DS(ON)}$  | $-V_{GS}=10V, -I_D=18A$                            |      |      | 25        | m $\Omega$ |
|                                                |               | $-V_{GS}=4.5V, -I_D=12A$                           |      |      | 33        |            |
| Forward transconductance                       | $g_{FS}$      | $-V_{DS}=10V, -I_D=18A$                            |      | 23   |           | S          |
| Dynamic parameters                             |               |                                                    |      |      |           |            |
| Input capacitance                              | $C_{iss}$     | $V_{GS}=0V, -V_{DS}=15V, f=1.0MHz$                 |      | 3635 |           | $\mu F$    |
| Out capacitance                                | $C_{oss}$     |                                                    |      | 224  |           |            |
| Reverse transfer capacitance                   | $C_{rss}$     |                                                    |      | 141  |           |            |
| Gate resistance                                | $R_g$         | $V_{DS}=0V, V_{GS}=0V, f=1.0MHz$                   |      | 7    |           | $\Omega$   |
| Switching parameters                           |               |                                                    |      |      |           |            |
| Total gate charge (-4.5)                       | $Q_g$         | $-V_{GS}=4.5V, -V_{DS}=20V, -I_D=12A$              |      | 25   |           | nC         |
| Gate to source charge                          | $Q_{gs}$      |                                                    |      | 6.7  |           |            |
| Gate to drain charge                           | $Q_{gd}$      |                                                    |      | 5.5  |           |            |
| Turn-on delay time                             | $t_{d(on)}$   | $-V_{DD}=15V, -V_{GS}=10V, R_G=3.3\Omega, -I_D=1A$ |      | 38   |           | ns         |
| Rise time                                      | $t_r$         |                                                    |      | 23.6 |           |            |
| Turn-off delay time                            | $t_{d(off)}$  |                                                    |      | 100  |           |            |
| Fall time                                      | $t_f$         |                                                    |      | 6.8  |           |            |
| Source-drain diode ratings and characteristics |               |                                                    |      |      |           |            |
| Drain-source diode forward voltage (Note 2)    | $-V_{SD}$     | $-I_S=1A, V_{GS}=0V$                               |      |      | 1         | V          |
| Continuous source current (Note 1, 5)          | $-I_S$        | $V_G=V_D=0V$ , Force current                       |      |      | 35        | A          |

Note: 1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2oz copper.

2. The data tested by pulsed, pulse width  $\leq 300\mu\text{s}$ , duty cycles  $\leq 2\%$ .

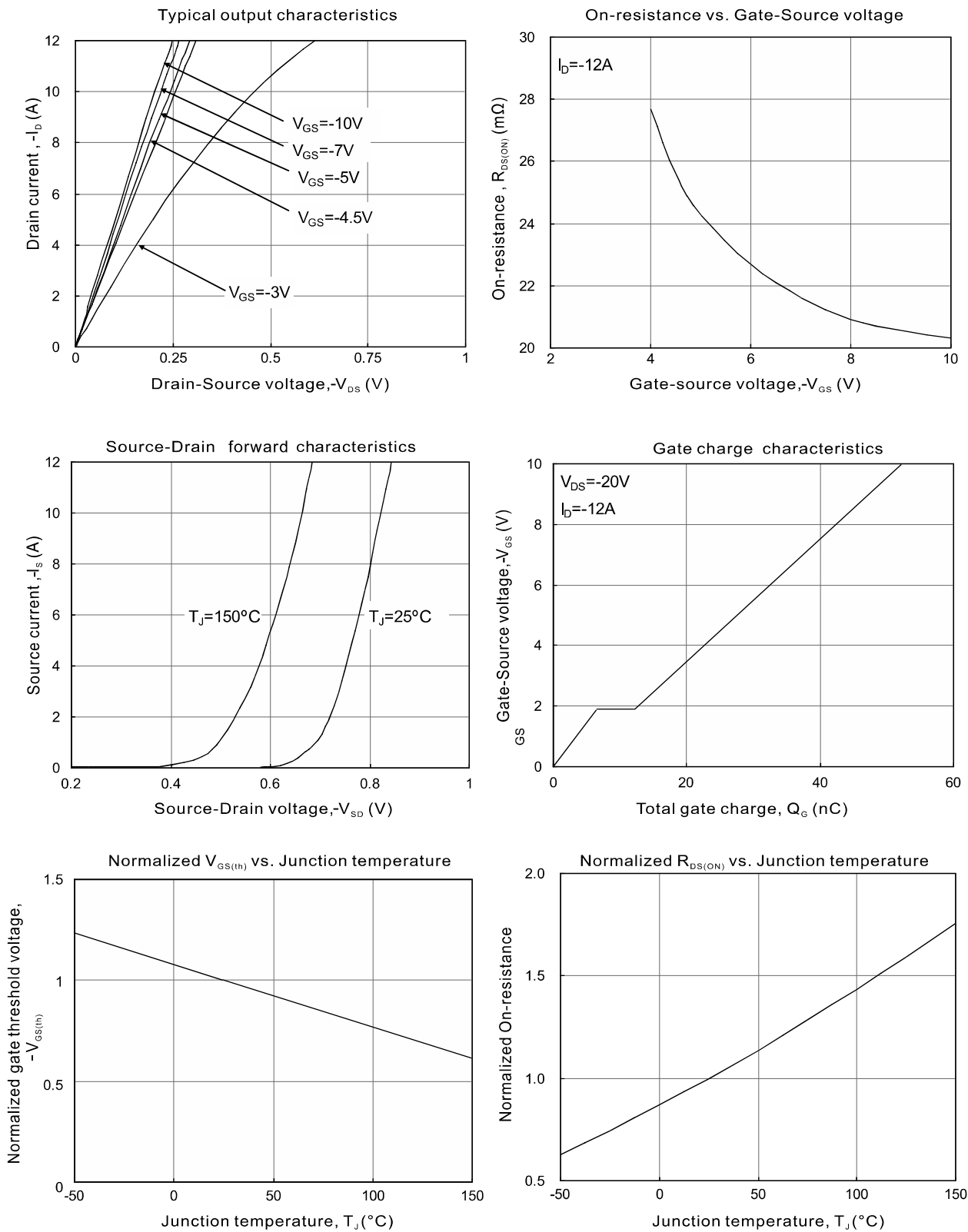
3. The  $E_{AS}$  data shows maximum rating, the test condition is  $-V_{DD}=25\text{V}$ ,  $-V_{GS}=10\text{V}$ ,  $L=0.1\text{mH}$ ,  $-I_{AS}=47.6\text{A}$ .

4. The power dissipation is limited by  $150^{\circ}\text{C}$  junction temperature.

5. The data is theoretically the same as  $I_D$  and  $I_{DM}$ , in real applications, should be limited by total power dissipation.

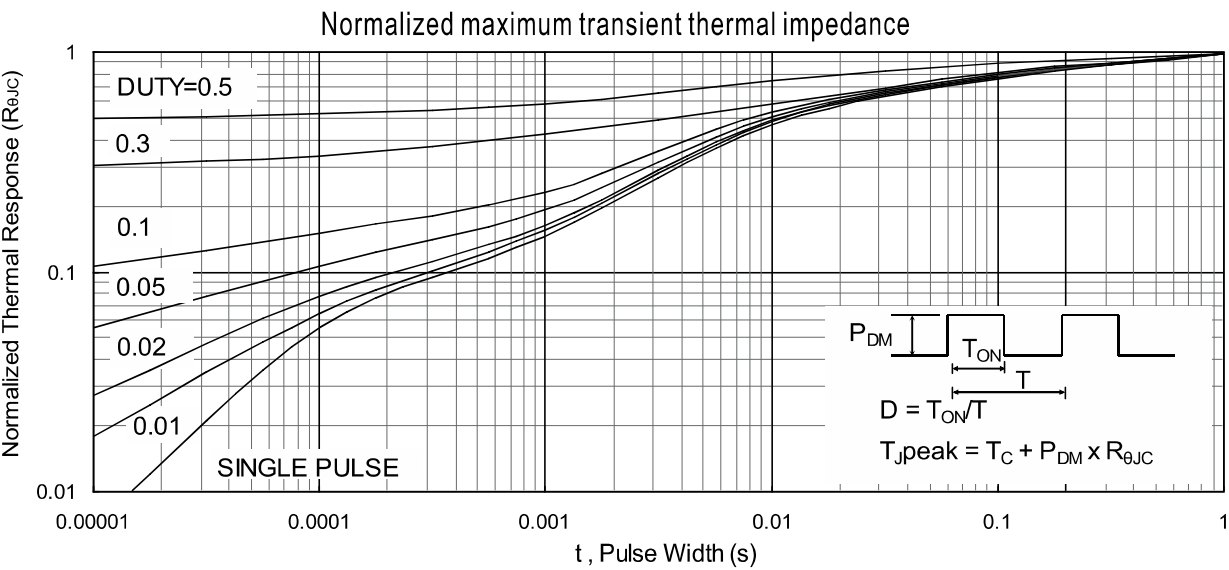
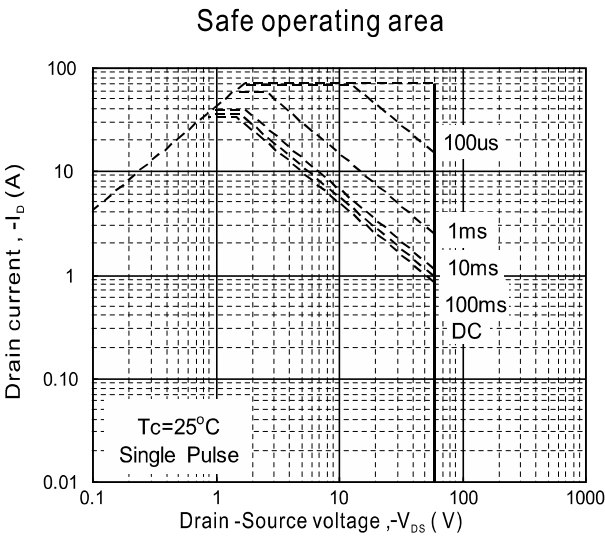
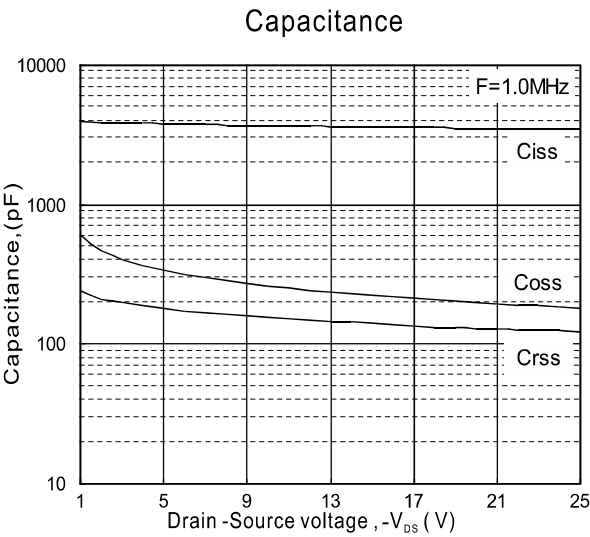
FMOSTHAC35P06-H

Rating and characteristic curves



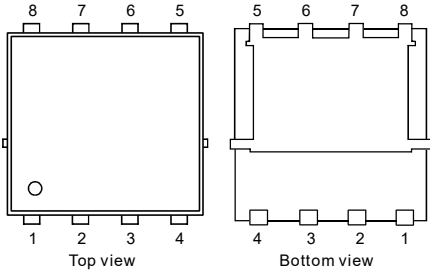
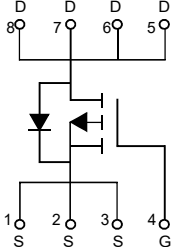
FMOSTHAC35P06-H

Rating and characteristic curves



FMOSTHAC35P06-H

Pinning information

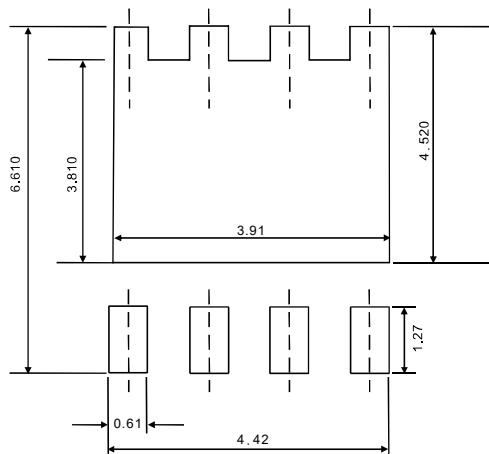
| Pin                                                       | Simplified outline                                                                                                    | Symbol                                                                              |
|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Pin 1, 2, 3, Source<br>Pin 4 Gate<br>Pin 5, 6, 7, 8 Drain |  <p>Top view</p> <p>Bottom view</p> |  |

Marking

| Type number     | Marking code |
|-----------------|--------------|
| FMOSTHAC35P06-H | AC35P06      |

Suggested solder pad layout

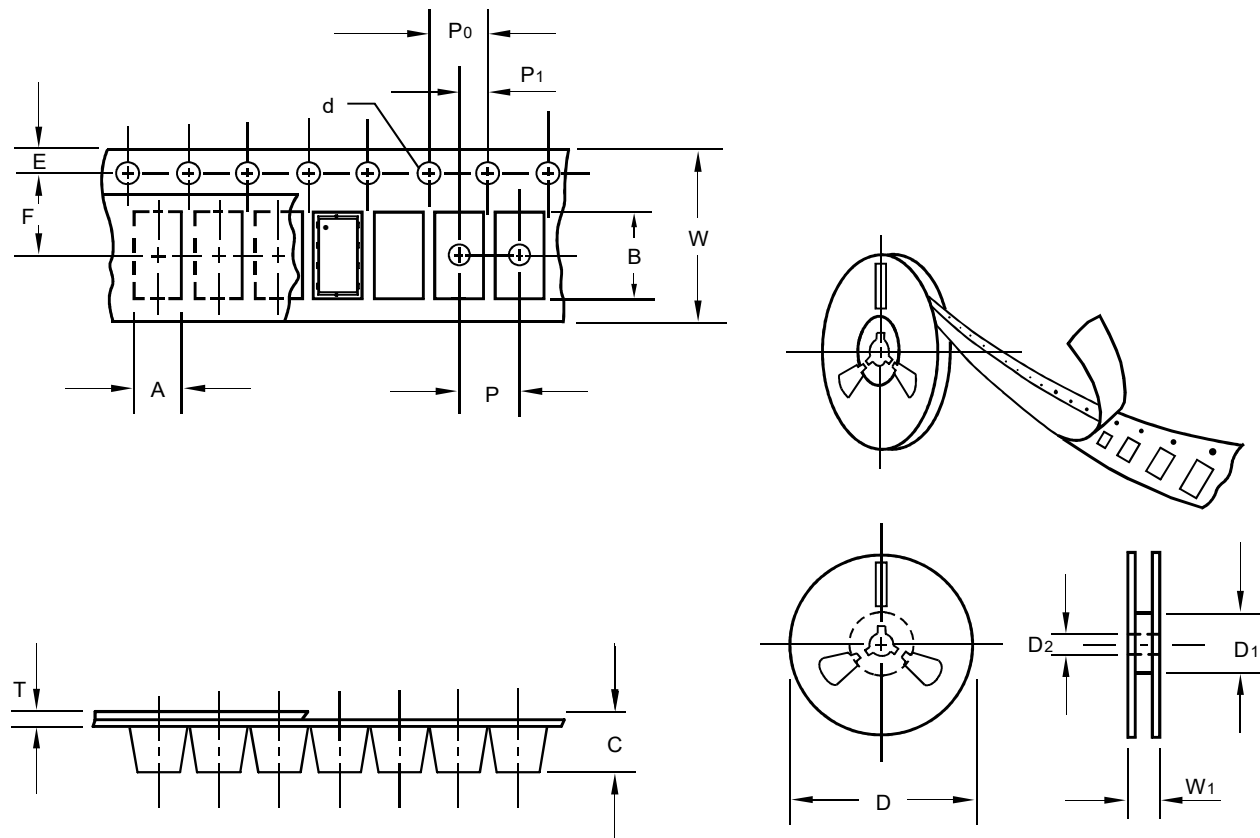
T5060P8



Note:  
1. Controlling dimension: in millimeters.  
2. General tolerance:  $\pm 0.1\text{mm}$   
3. The pad layout is for reference purposes only.

FMOSTHAC35P06-H

Packing information



unit:mm

| Item                      | Symbol | Tolerance | T5060P8 |
|---------------------------|--------|-----------|---------|
| Carrier width             | A      | 0.1       | 6.50    |
| Carrier length            | B      | 0.1       | 5.28    |
| Carrier depth             | C      | 0.1       | 2.00    |
| Sprocket hole             | d      | 0.1       | 1.50    |
| 13" Reel outside diameter | D      | 2.0       | 330.00  |
| 13" Reel inner diameter   | D1     | min       | 99.50   |
| 7" Reel outside diameter  | D      | 2.0       | -       |
| 7" Reel inner diameter    | D1     | min       | -       |
| Feed hole diameter        | D2     | 0.5       | 13.00   |
| Sprocket hole position    | E      | 0.1       | 1.75    |
| Punch hole position       | F      | 0.1       | 5.50    |
| Punch hole pitch          | P      | 0.1       | 8.00    |
| Sprocket hole pitch       | P0     | 0.1       | 4.00    |
| Embossment center         | P1     | 0.1       | 2.00    |
| Overall tape thickness    | T      | 0.1       | 0.25    |
| Tape width                | W      | 0.3       | 12.00   |
| Reel width                | W1     | 1.0       | 17.60   |

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

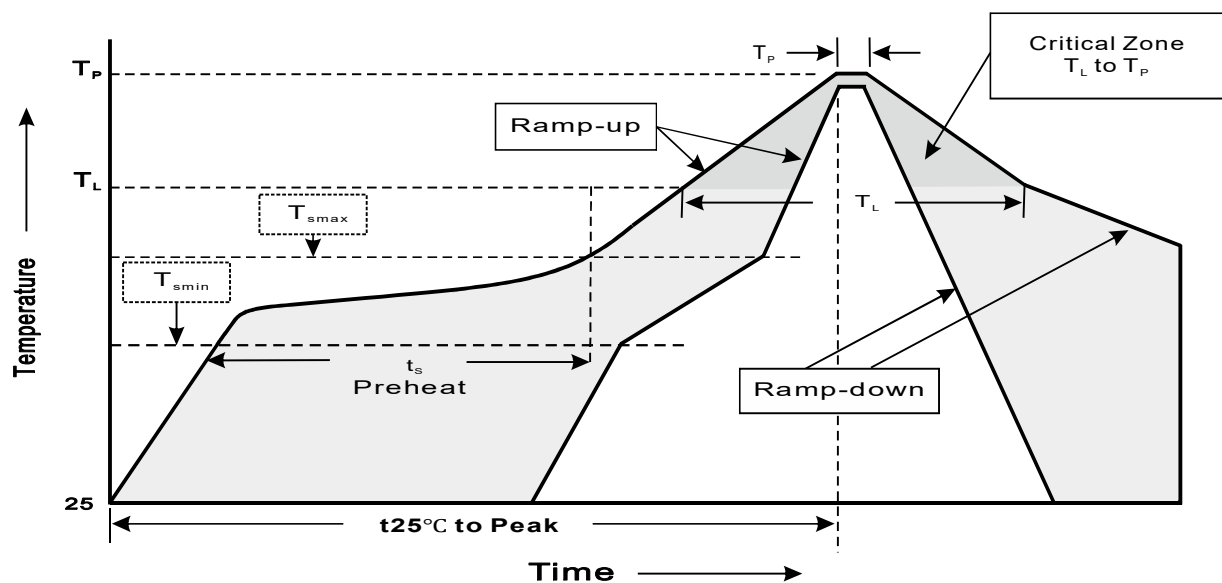
## FMOSTHAC35P06-H

## Reel packing

| Device          | Outline | Device Package | Reel Size | Reel (pcs) |
|-----------------|---------|----------------|-----------|------------|
| FMOSTHAC35P06-H | Taping  | T5060P8        | 13 inch   | 3,000      |

## Suggested thermal profiles for soldering processes

- 1.Storage environment : Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices



## 3.Reflow soldering

| Profile feature                                                                                               | Soldering Condition           |
|---------------------------------------------------------------------------------------------------------------|-------------------------------|
| Average ramp-up rate ( $T_L$ to $T_P$ )                                                                       | < 3°C/sec                     |
| Preheat<br>-Temperature Min ( $T_{smin}$ )<br>-Temperature Max ( $T_{smax}$ )<br>-Time (min to max) ( $t_s$ ) | 150°C<br>200°C<br>60 ~ 120sec |
| $T_{smax}$ to $T_L$<br>-Ramp-up rate                                                                          | < 3°C/sec                     |
| Time maintained above:<br>-Temperature ( $T_L$ )<br>-Time( $T_L$ )                                            | 217°C<br>60 ~ 260 sec         |
| Peak Temperature( $T_P$ )                                                                                     | 255°C -0/+5°C                 |
| Time within 5°C of actual peak Temperature( $T_P$ )                                                           | 10 ~ 30sec                    |
| Ramp-down rate                                                                                                | < 6°C/sec                     |
| Time 25°C to peak temperature                                                                                 | < 6 minutes                   |