

FMOSAT56DN06-Q1

List

List.....	1
Package outline.....	2
Features.....	2
Mechanical data.....	2
Maximum ratings	2
Electrical characteristics.....	3
Rating and characteristic curves.....	4~6
Pinning information.....	6
Marking.....	6
Suggested solder pad layout.....	6
Packing information.....	7
Reel packing.....	8
Suggested thermal profiles for soldering processes.....	8

FMOSAT56DN06-Q1

56A 60V Dual N-Channel Enhancement Mode Power MOSFET

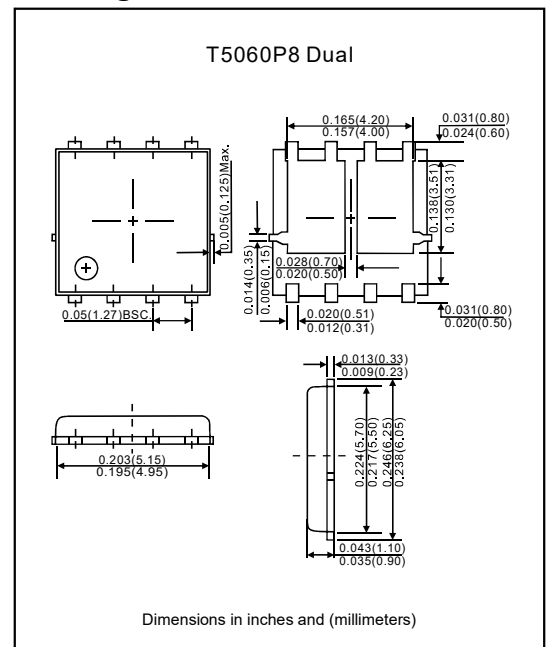
Features

- $V_{DS}=60V$, $I_D=56A$.
- $R_{DS(ON)} \leq 5.8m\Omega$ @ $V_{GS}=10V$, $I_D=20A$.
- Ultra-low on-resistance and low gate charge.
- 100% UIS and R_g tested.
- Qualified to AEC-Q101 standards for high reliability.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates Halogen-free part, ex. FMOSAT56DN06-Q1-H.

Mechanical data

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

Package outline



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

Parameter	Symbol	Ratings	Unit
Drain-source voltage	V_{DS}	60	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain Current (Note 1)	I_D	$T_c=25^\circ C$ 56	A
		$T_c=100^\circ C$ 40	
Pulsed drain current (Note 2)	I_{DM}	224	A
Single pulse avalanche energy (Note 3)	E_{AS}	216	mJ
Power dissipation (Note 4)	P_D	$T_c=25^\circ C$ 38	W
		$T_c=100^\circ C$ 18.7	
Thermal resistance junction to ambient	$R_{\theta JA}$	60	$^\circ C/W$
Thermal resistance Junction to case	$R_{\theta JC}$	4.8	$^\circ C/W$
Operating Junction temperature	T_J	+175	$^\circ C$
Storage temperature range	T_{STG}	-55 to +175	$^\circ C$

FMOSAT56DN06-Q1

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_{DS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	60			V
Drain-source leakage current	I_{DSS}	$V_{DS}=48\text{V}$, $V_{GS}=0\text{V}$			1	μA
		$V_{DS}=48\text{V}$, $V_{GS}=0\text{V}$, $T_J=55^\circ\text{C}$			5	
Gate-source leakage current	I_{GSS}	$V_{GS}=\pm 20\text{V}$, $V_{DS}=0\text{V}$			± 100	nA

On characteristics

Gate threshold voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}$, $I_D=250\mu\text{A}$	2.2	2.8	3.4	V
Static drain-source on-resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=20\text{A}$		4.7	5.8	m Ω
Forward transconductance	g_{FS}	$V_{DS}=5\text{V}$, $I_D=20\text{A}$		80		S

Dynamic parameters (Note 5)

Input capacitance	C_{iss}	$V_{GS}=0\text{V}$, $V_{DS}=30\text{V}$, $f=1.0\text{MHz}$		1492		pF
Out capacitance	C_{oss}			940		
Reverse transfer capacitance	C_{rss}			109		
Gate resistance	R_g	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1.0\text{MHz}$		2.2		Ω

Switching parameters (Note 5)

Total gate charge	Q_g	$V_{GS}=10\text{V}$, $V_{DS}=30\text{V}$, $I_D=20\text{A}$		34		nC
		$V_{GS}=6\text{V}$, $V_{DS}=30\text{V}$, $I_D=20\text{A}$		21		
Gate to source charge	Q_{gs}	$V_{GS}=0$ to 10V , $V_{DS}=30\text{V}$, $I_D=20\text{A}$		11.4		
Gate to drain charge	Q_{gd}			5		
Turn-on delay time	$t_{d(on)}$	$V_{DS}=30\text{V}$, $V_{GS}=10\text{V}$, $R_G=3\Omega$, $R_L=1.5\Omega$		12.6		ns
Rise time	t_r			27		
Turn-off delay time	$t_{d(off)}$			28		
Fall time	t_f			8		

Source-drain diode ratings and characteristics

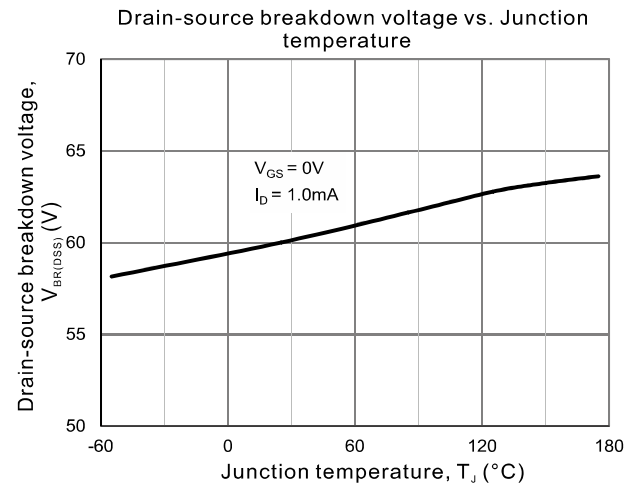
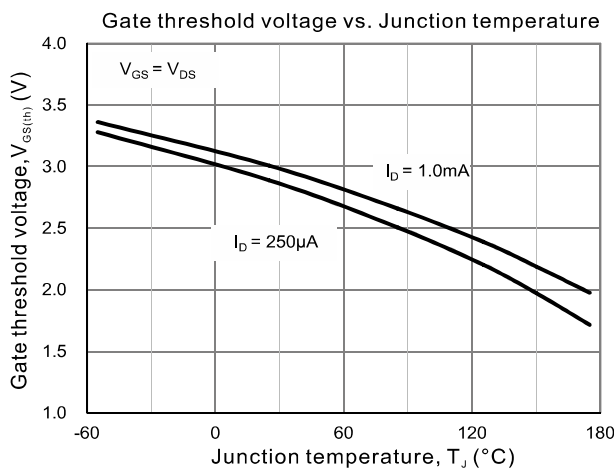
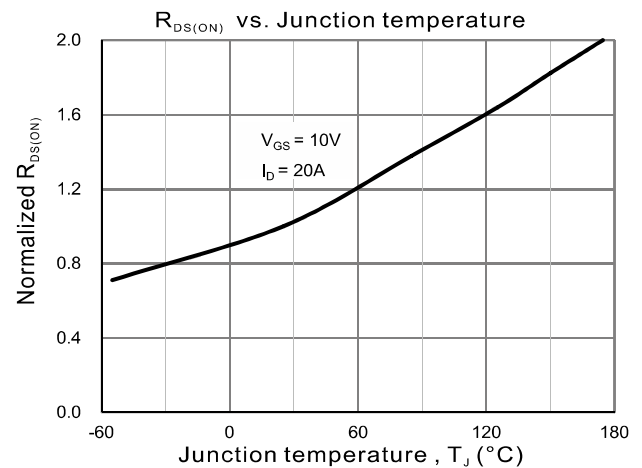
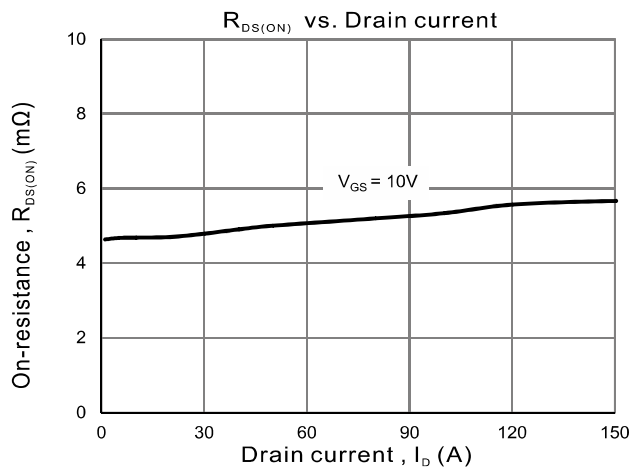
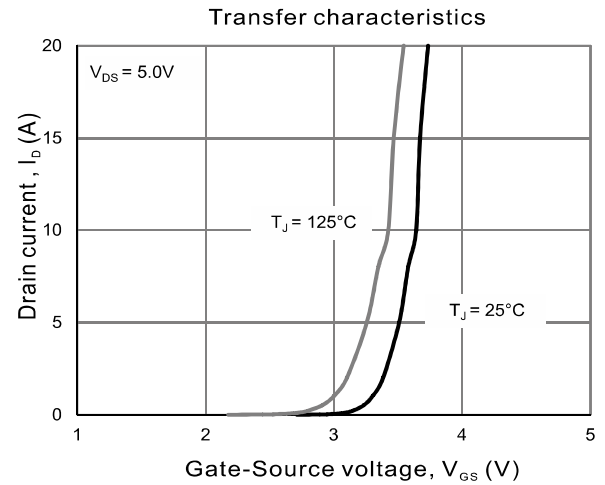
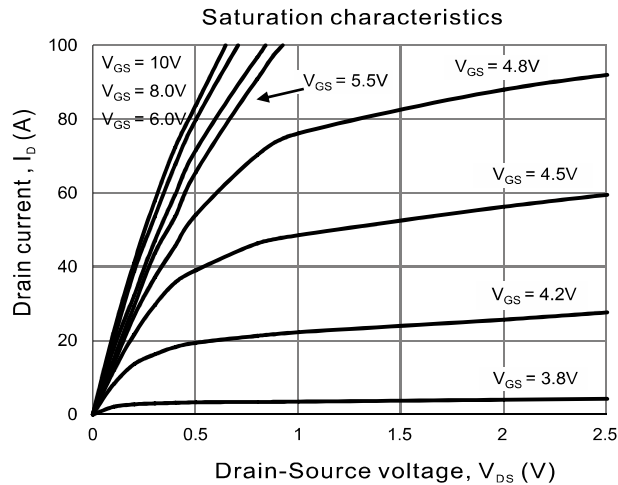
Drain-source diode forward voltage	V_{SD}	$I_S=1\text{A}$, $V_{GS}=0\text{V}$		0.7	1	V
Diode continuous current	I_S	$T_C=25^\circ\text{C}$			38	A
Body diode reverse recovery time	t_{rr}	$I_F=20\text{A}$, $dI_F/dt=100\text{A}/\mu\text{s}$		35		ns
Body diode reverse recovery charge	Q_{rr}			25		nC

Notes :

1. Computed continuous current assumes the condition of T_{J_Max} while the actual continuous current depends on the thermal & electro-mechanical application board design.
2. This single-pulse measurement was taken under $T_{J_Max}=175^\circ\text{C}$.
3. E_{AS} of 216 mJ is based on starting $T_J=25^\circ\text{C}$, $L=3\text{mH}$, $I_{AS}=12\text{A}$, $V_{GS}=10\text{V}$, $V_{DS}=30\text{V}$; 100% test at $L=0.3\text{mH}$, $I_{AS}=25\text{A}$, $T_{J_Max}=175^\circ\text{C}$.
4. The power dissipation P_D is based on $T_{J_Max}=175^\circ\text{C}$.
5. This value is guaranteed by design hence it is not included in the production test.

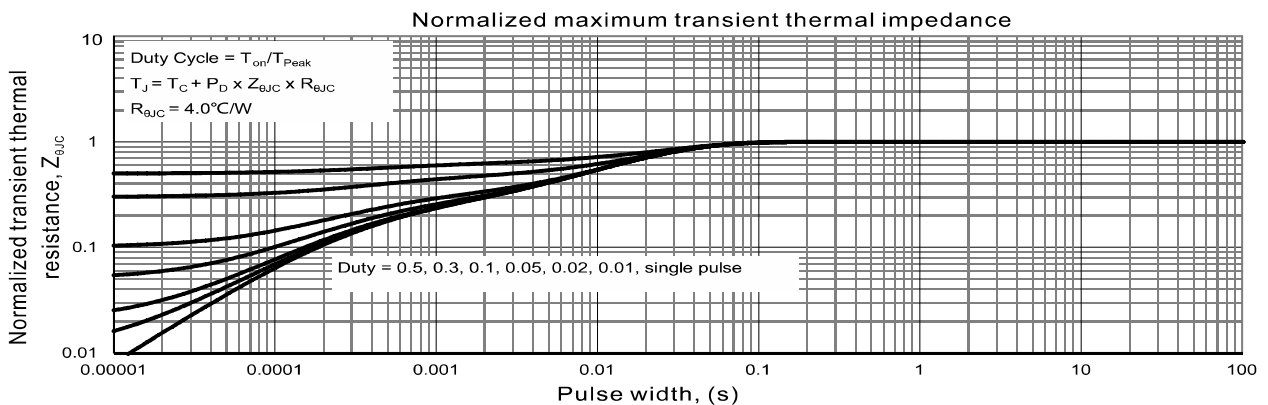
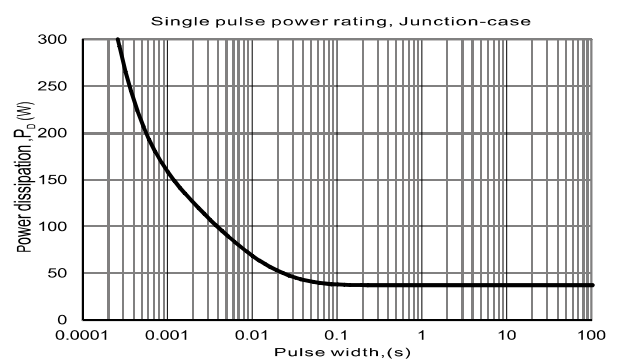
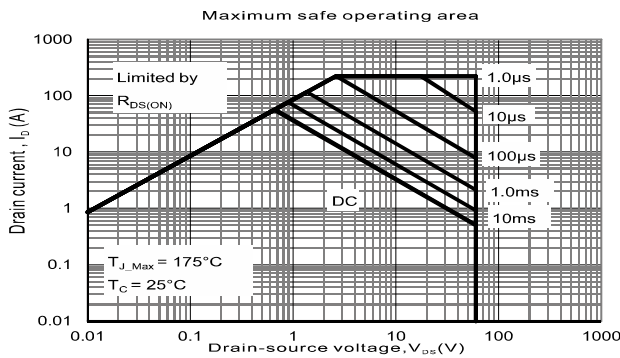
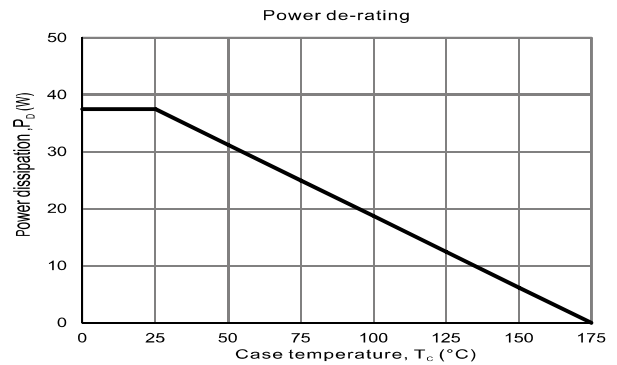
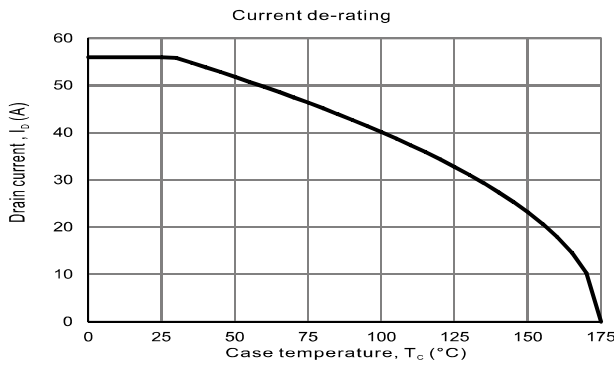
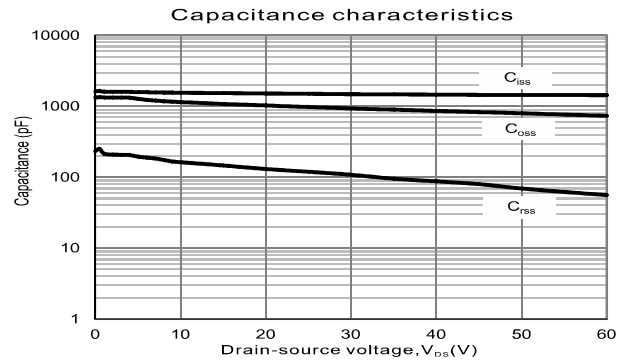
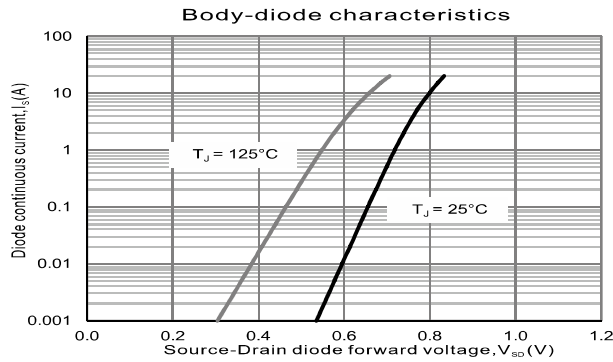
FMOSAT56DN06-Q1

Rating and characteristic curves



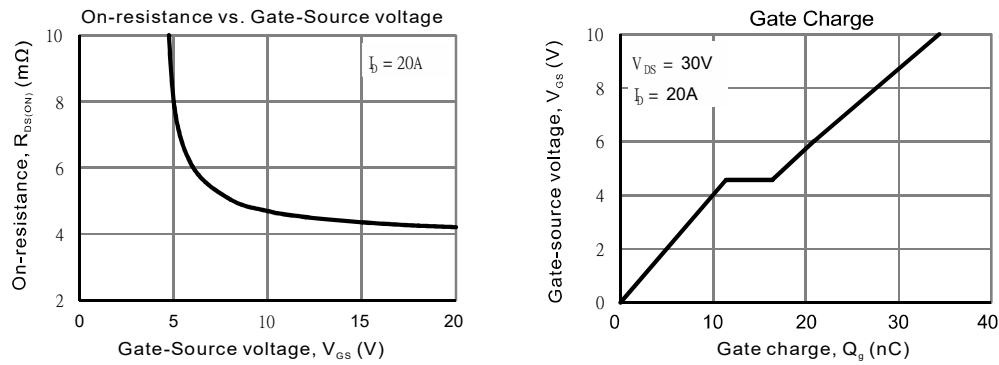
FMOSAT56DN06-Q1

Rating and characteristic curves



FMOSAT56DN06-Q1

Rating and characteristic curves



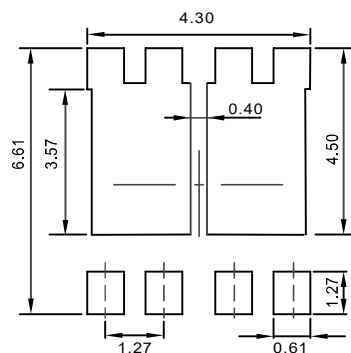
Pinning information

Pin		Simplified outline	Symbol
Pin 1	Source 1	Top view Bottom view	
Pin 2	Gate 1		
Pin 3	Source 2		
Pin 4	Gate 2		
Pin 5, 6	Drain 2		
Pin 7, 8	Drain 1		

Marking

Type number	Marking code
FMOSAT56DN06-Q1	H0605ADQ

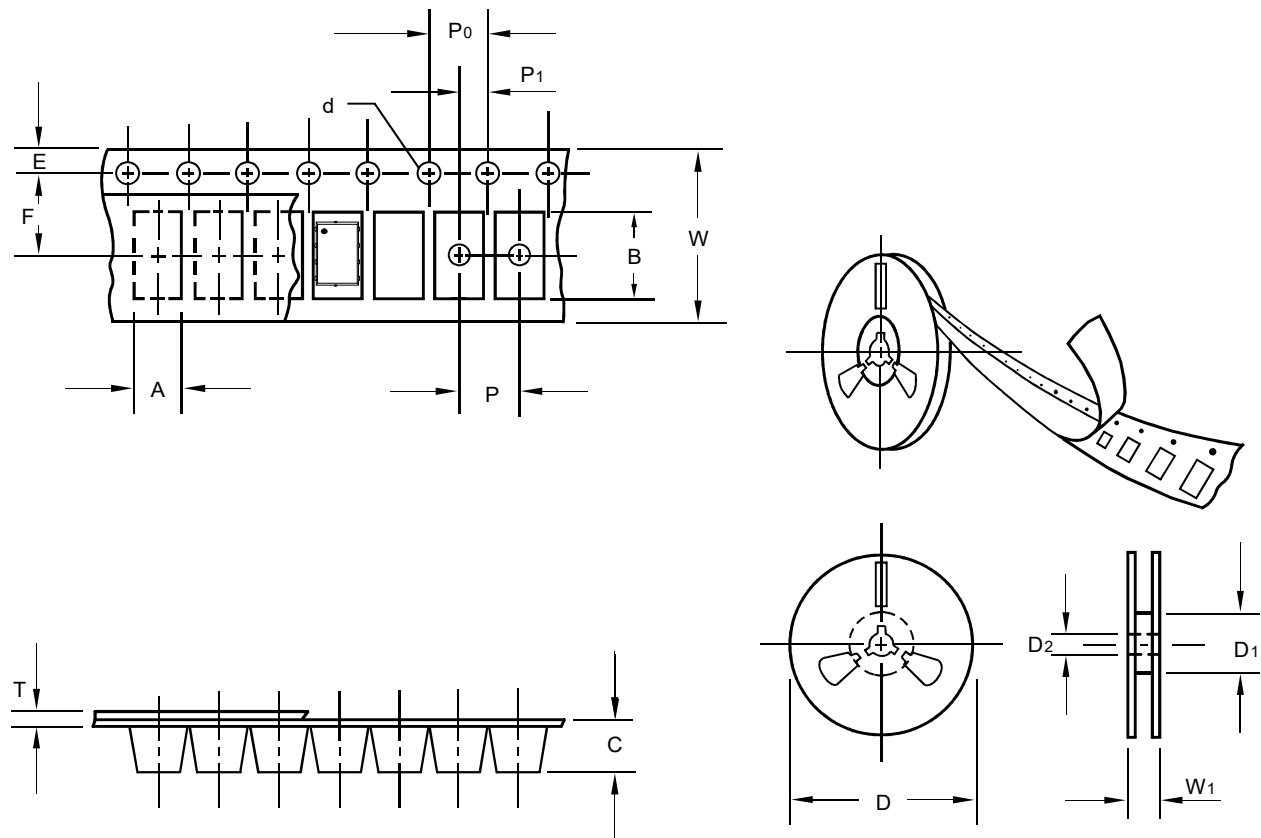
Suggested solder pad layout



Note:
1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.05mm$
3. The pad layout is for reference purposes only.

FMOSAT56DN06-Q1

Packing information



unit:mm

Item	Symbol	Tolerance	T5060P8 Dual
Carrier width	A	0.1	6.40
Carrier length	B	0.1	5.40
Carrier depth	C	0.1	1.25
Sprocket hole	d	0.1	1.55
13" Reel outside diameter	D	2.0	330.00
13" Reel inner diameter	D1	min	100.00
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	0.30
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.

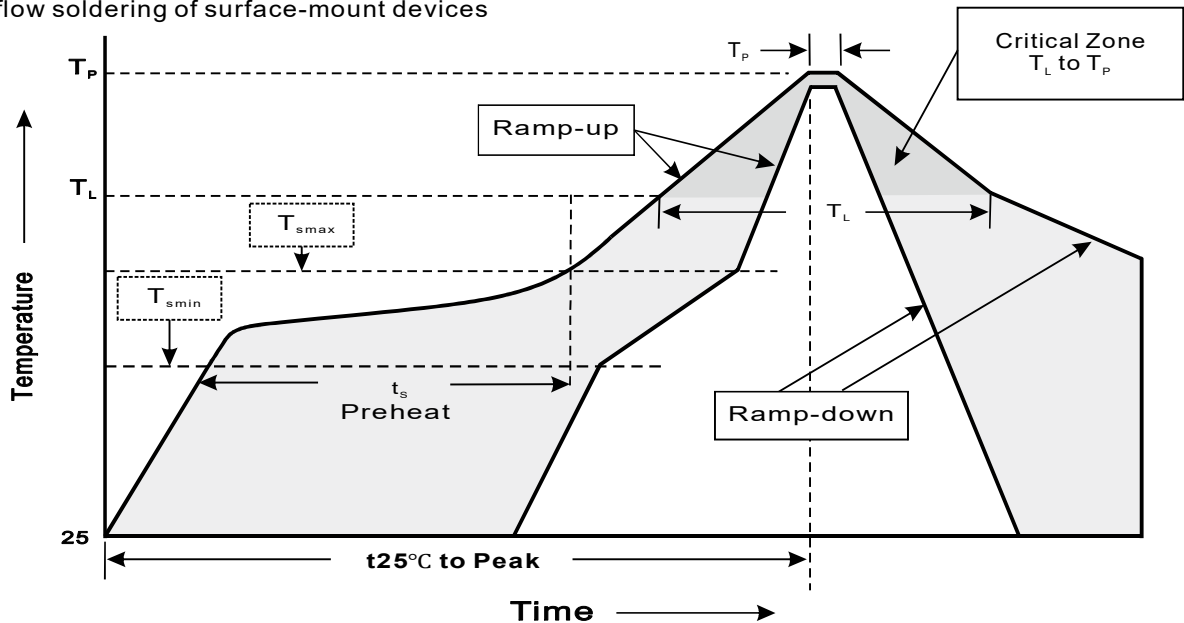
FMOSAT56DN06-Q1

Reel packing

Device	Outline	Device Package	Reel Size	Reel (pcs)
FMOSAT56DN06-Q1	Taping	T5060P8 Dual	13 inch	5,000

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
Prehaeat -Temperature Min (T_{smin}) -Temperature Max (T_{smax}) -Time (min to max) (t_s)	150°C 200°C 60 ~120sec
T_{smax} to T_L -Ramp-up rate	< 3°C/sec
Time maintained above: -Temperature (T_L) -Time(T_L)	217°C 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