

FMOSAC87N15-Q1

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FMOSAC87N15-Q1

87A 150V N-Channel Power MOSFET

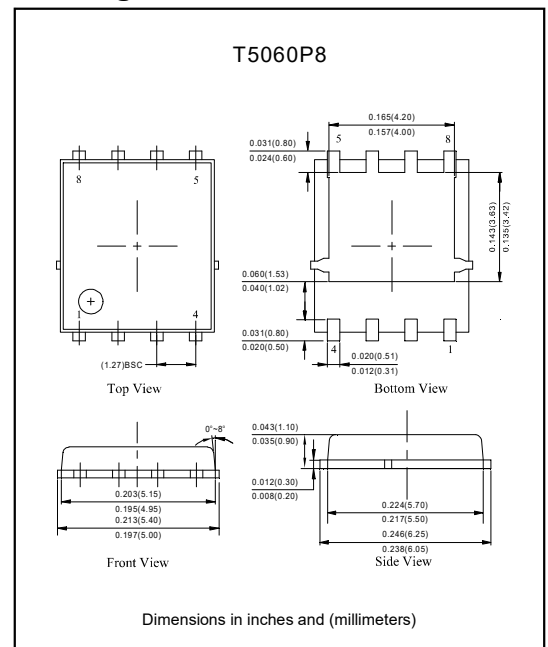
Features

- $V_{DS} = 150V$, $I_D = 87A$.
- $R_{DS(ON)} \leq 9.9m\Omega$ @ $V_{GS} = 10V$, $I_D = 20A$.
- Ultra-low on-resistance.
- 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. FMOSAC87N15-Q1-H.

Mechanical data

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

Package outline

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

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	150	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain Current (Note 1) ($T_c = 25^\circ C$)	I_D	87	A
(Note 1) ($T_c = 100^\circ C$)		61	
Pulsed drain current (Note 2)	I_{DM}	320	A
Avalanche current (Note 3)	I_{AS}	47	A
Single pulse avalanche energy (Note 3)	E_{AS}	331	mJ
Power dissipation (Note 4) ($T_c = 25^\circ C$)	P_D	188	W
(Note 4) ($T_c = 100^\circ C$)		94	
Operating Junction temperature	T_j	+175	$^\circ C$
Storage temperature range	T_{STG}	-55 to +175	$^\circ C$
Thermal resistance, Junction to ambient	$R_{\theta JA}$	50	$^\circ C/W$
Thermal resistance Junction to case	$R_{\theta JC}$	1.0	$^\circ C/W$

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	150			V
Drain-source leakage current	I_{DSS}	$V_{DS}=120\text{V}$, $V_{GS}=0\text{V}$			1	μA
		$V_{DS}=120\text{V}$, $V_{GS}=0\text{V}$, $T_J=55^{\circ}\text{C}$			5	
Gate-source leakage current	I_{GSS}	$V_{GS}=\pm 20\text{V}$, $V_{DS}=0\text{V}$			± 100	nA
Gate threshold voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}$, $I_D=250\mu\text{A}$	2.5	3.2	4.5	V
Static drain-source on-resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=20\text{A}$		8.5	9.9	m Ω
Forward transconductance	g_{FS}	$V_{DS}=5\text{V}$, $I_D=20\text{A}$		60		S

Dynamic parameters (Note 5)

Input capacitance	C_{iss}	$V_{GS}=0\text{V}$, $V_{DS}=75\text{V}$, $f=1.0\text{MHz}$		2181		pF
Out capacitance	C_{oss}			363		
Reverse transfer capacitance	C_{rss}			7.9		
Gate resistance	R_g	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1.0\text{MHz}$		2.5		Ω

Switching parameters (Note 5)

Total gate charge	Q_g	$V_{GS}=10\text{V}$, $V_{DS}=75\text{V}$, $I_D=20\text{A}$		30		nC
Gate to source charge	Q_{gs}			7.5		
Gate to drain charge	Q_{gd}			6.5		
Turn-on delay time	$t_{d(on)}$	$V_{DS}=75\text{V}$, $V_{GS}=10\text{V}$, $R_L=3.75\Omega$, $R_{GEN}=6\Omega$		12.5		ns
Rise time	t_r			24		
Turn-off delay time	$t_{d(off)}$			30		
Fall time	t_f			26		

Source-drain diode ratings and characteristics

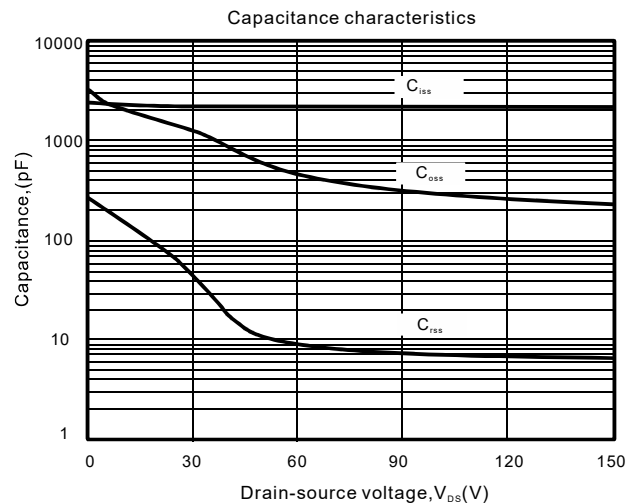
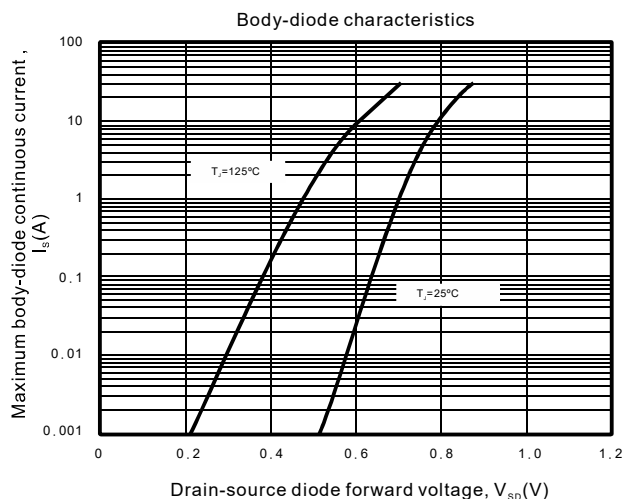
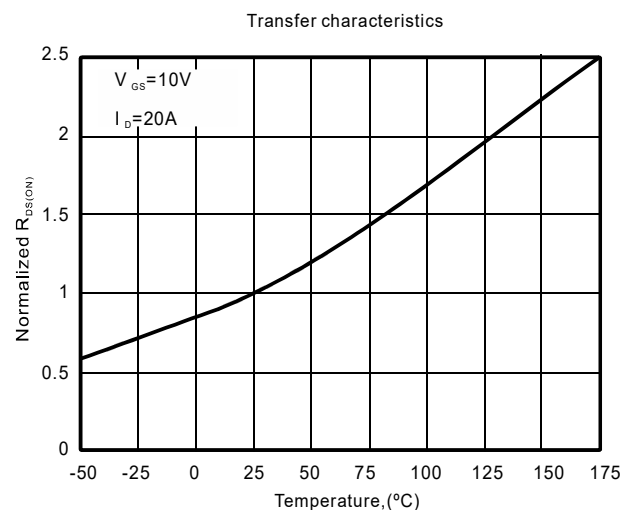
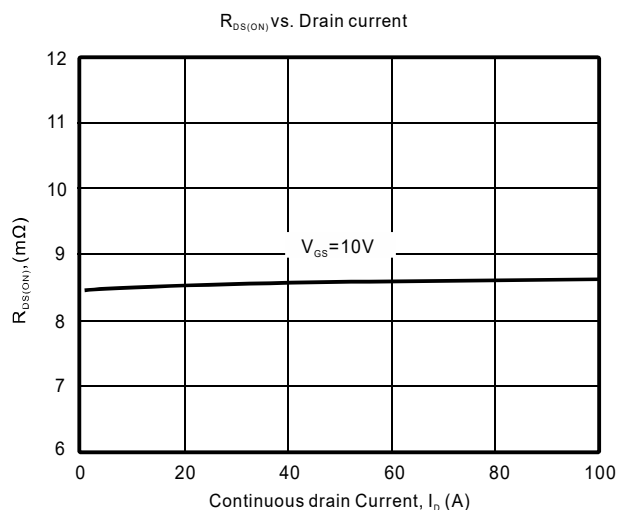
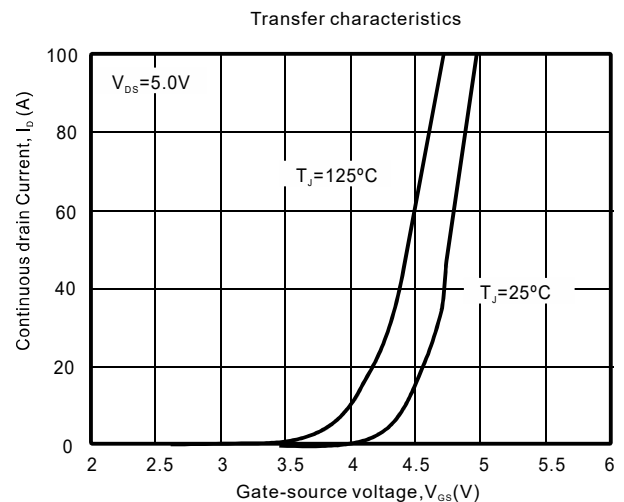
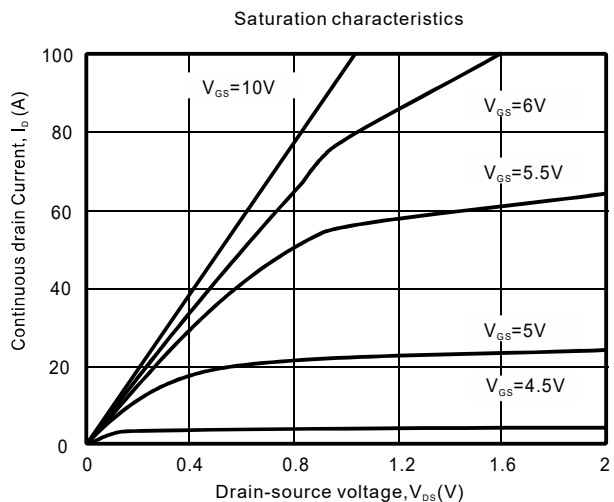
Maximum body-diode continuous current	I_S	$T_C=25^{\circ}\text{C}$			188	A
Drain-source diode forward voltage	V_{SD}	$I_S=1\text{A}$, $V_{GS}=0\text{V}$		0.71	1.0	V
Body diode reverse recovery time	t_{rr}	$I_F=20\text{A}$, $dI_F/dt=100\text{A}/\mu\text{s}$		99		ns
Body diode reverse recovery charge	Q_{rr}			318		nC

Note:

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. This single-pulse measurement was taken under the following condition [$L=300\mu\text{H}$, $V_{GS}=10\text{V}$, $V_{DS}=75\text{V}$] while its value is limited by $T_{J_MAX}=175^{\circ}\text{C}$.
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.

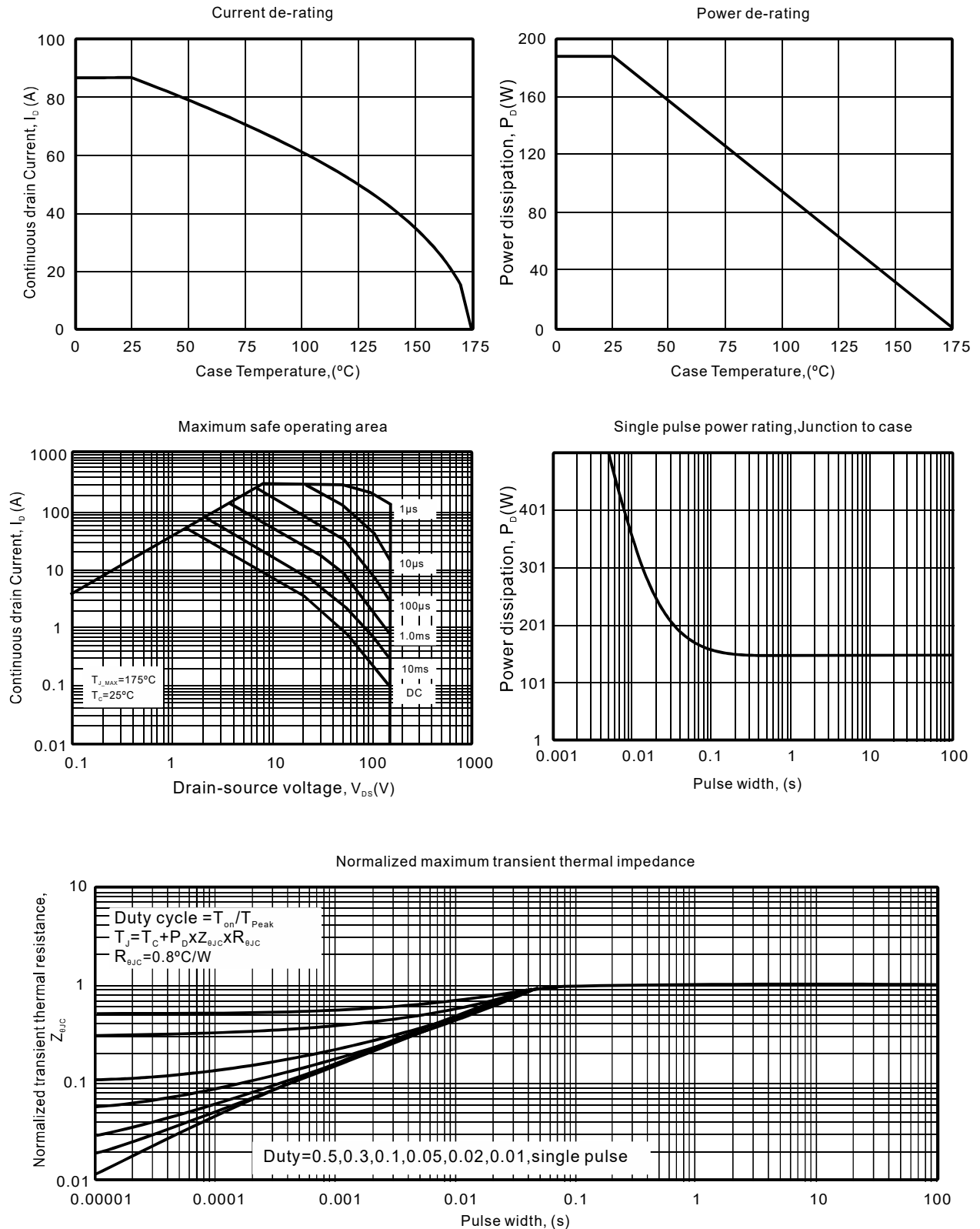
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Rating and characteristic curves



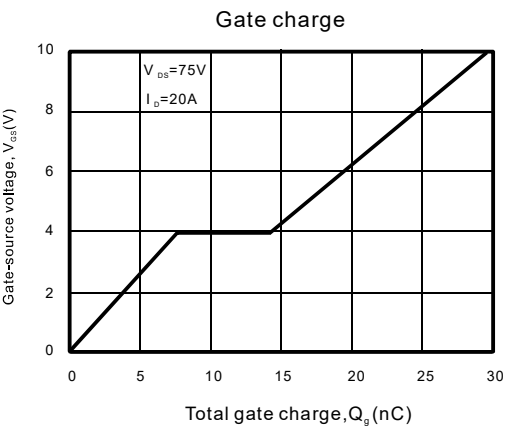
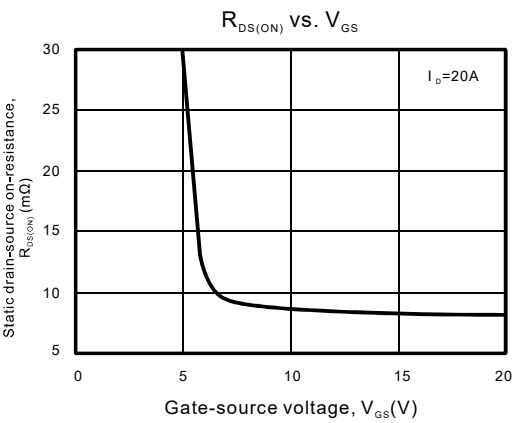
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Rating and characteristic curves



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Rating and characteristic curves



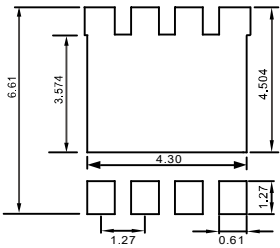
Pinning information

Pin	Simplified outline	Symbol
Pin1 Source Pin2 Source Pin3 Source Pin4 Gate Pin5 Drain Pin6 Drain Pin7 Drain Pin8 Drain		

Marking

Type number	Marking code
FMOSAC87N15-Q1	SH1509AQ

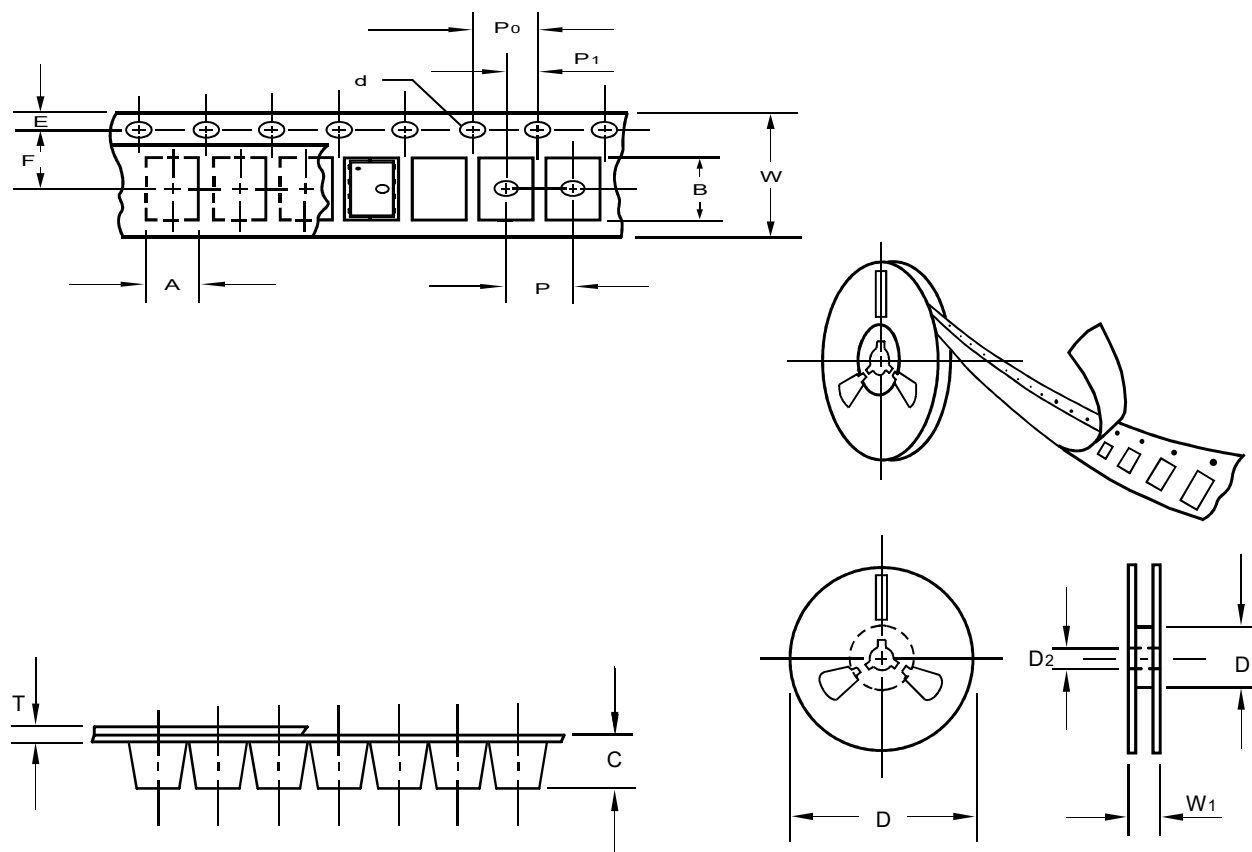
Suggested solder pad layout



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

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Packing information



unit:mm

Item	Symbol	Tolerance	T5060P8
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.

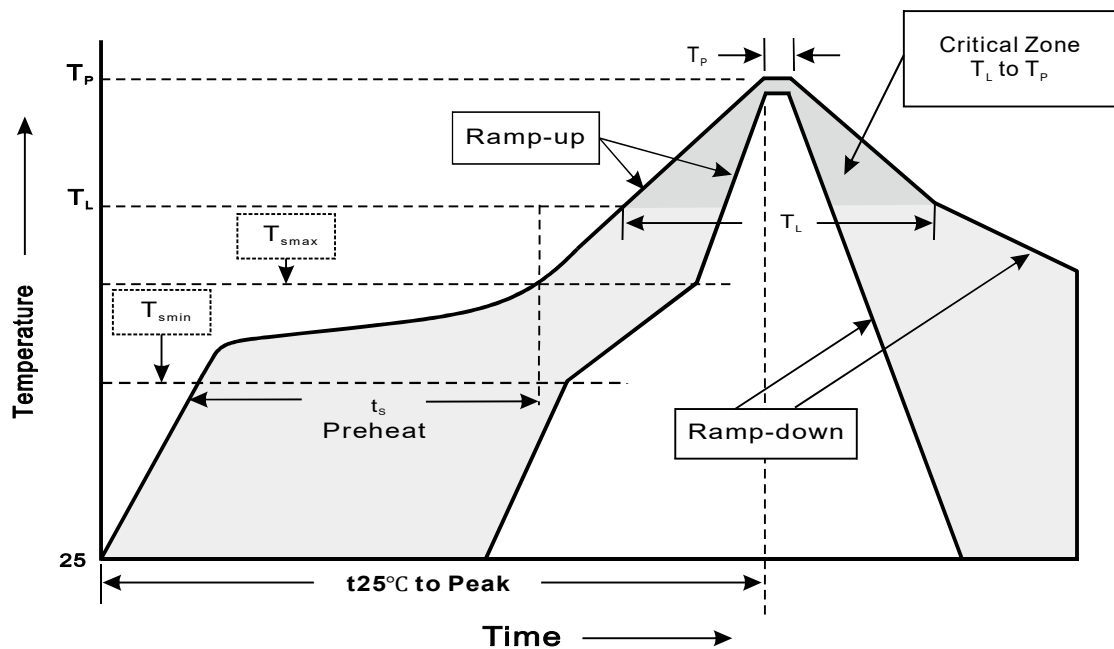
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Reel packing

Device	Outline	Device Package	Reel Size	Reel (pcs)
FMOSAC87N15-Q1	Taping	T5060P8	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
Preheat -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