

FMOSAC51N15

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FMOSAC51N15

51A 150V N-Channel MOSFET

Features

- $V_{DS}=150V$, $I_D=51A$.
- $R_{DS(ON)} \leq 16.8m\Omega$ @ $V_{GS}=10V$, $I_D=20A$.
- Ultra-low $R_{DS(ON)}$ and Low gate charge.
- 100% UIS and R_g tested.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates Halogen-free part, ex.FMOSAC51N15-H.

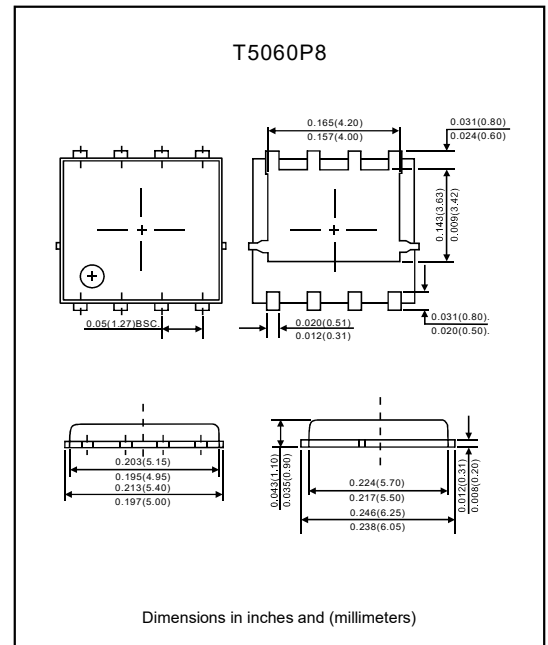
Application

- Power management in telecom, industrial automation, CE.
- Current switching in DC/DC & AC/DC (SR) sub-systems.
- Motor driving in power tool, E-vehicle, robotics.

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}	150	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain Current (Note 1)	I_D	$T_c=25^\circ C$ 51	A
		$T_c=100^\circ C$ 32	
Pulsed drain current (Note 2)	I_{DM}	180	A
Single pulse avalanche current (Note 3)	I_{AS}	30	A
Single pulse avalanche energy (Note 3)	E_{AS}	135	mJ
Power dissipation (Note 4)	P_D	$T_c=25^\circ C$ 96	W
		$T_c=100^\circ C$ 38	
Operating Junction temperature	T_J	+150	$^\circ C$
Storage temperature range	T_{STG}	-55 to +150	$^\circ C$
Thermal resistance junction to ambient	$R_{\theta JA}$	65	$^\circ C/W$
Thermal resistance Junction to case	$R_{\theta JC}$	1.3	$^\circ C/W$

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off characteristics						
Drain-source breakdown voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	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

On characteristics

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	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=20\text{A}$		14.2	16.8	m Ω
Forward transconductance	g_{FS}	$V_{DS}=5\text{V}$, $I_D=20\text{A}$		58		S

Dynamic parameters (Note 5)

Input capacitance	C_{iss}	$V_{GS}=0\text{V}$, $V_{DS}=75\text{V}$, $f=1.0\text{MHz}$		1603		pF
Out capacitance	C_{oss}			196		
Reverse transfer capacitance	C_{rss}			7.5		
Gate resistance	R_g	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1.0\text{MHz}$		1.8		Ω

Switching parameters (Note 5)

Total gate charge	Q_g	$V_{GS}=10\text{V}$, $V_{DS}=75\text{V}$, $I_D=20\text{A}$		23		nC
		$V_{GS}=6\text{V}$, $V_{DS}=75\text{V}$, $I_D=20\text{A}$		15.2		
Gate to source charge	Q_{gs}	$V_{GS}=0$ to 10V , $V_{DS}=75\text{V}$, $I_D=20\text{A}$		7.7		
Gate to drain charge	Q_{gd}			4.7		
Turn-on delay time	$t_{d(on)}$	$V_{DS}=75\text{V}$, $V_{GS}=10\text{V}$, $R_G=6\Omega$, $R_L=3.75\Omega$		7.1		ns
Rise time	t_r			8.4		
Turn-off delay time	$t_{d(off)}$			17		
Fall time	t_f			11		

Source-drain diode ratings and characteristics

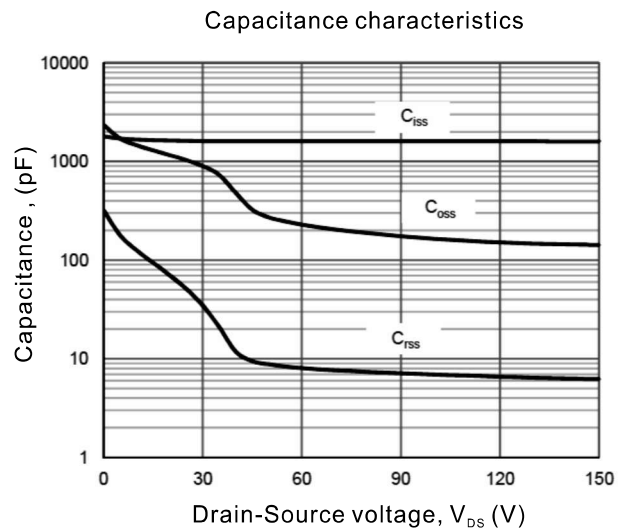
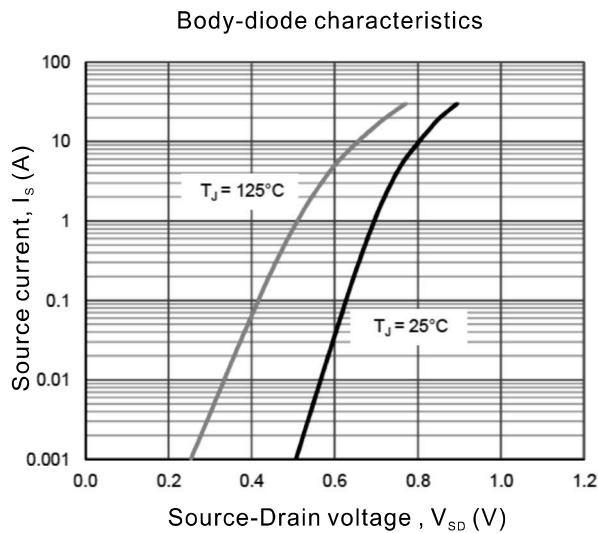
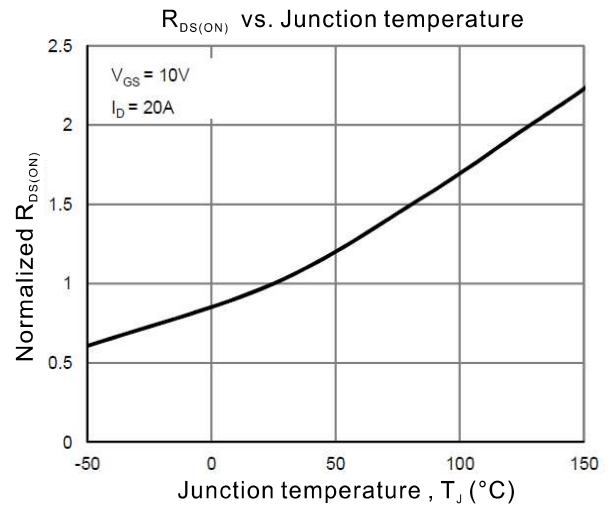
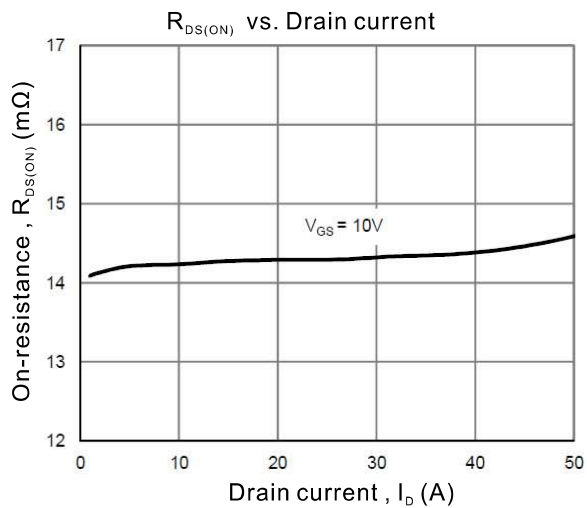
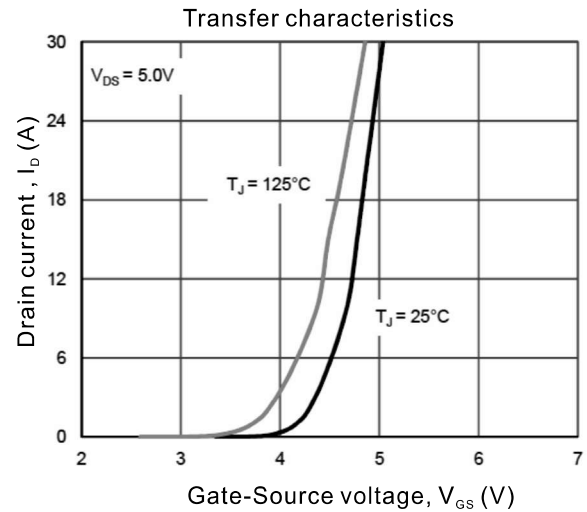
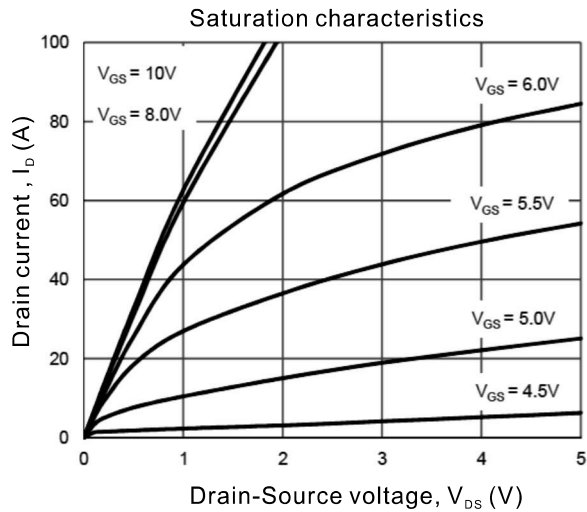
Drain-source diode forward voltage	V_{SD}	$I_S=1\text{A}$, $V_{GS}=0\text{V}$		0.69	1	V
Diode continuous current	I_S				96	A
Body diode reverse recovery time	t_{rr}	$I_F=20\text{A}$, $dI_F/dt=100\text{A}/\mu\text{s}$		86		ns
Body diode reverse recovery charge	Q_{rr}			137		nC

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 $T_{J_{Max}}=150^\circ\text{C}$.
3. This single-pulse measurement was taken under the following condition [$L=300\mu\text{H}$, $V_{GS}=10\text{V}$, $V_{DS}=100\text{V}$] while its value is limited by $T_{J_{Max}}=150^\circ\text{C}$.
4. The power dissipation P_D is based on $T_{J_{Max}}=150^\circ\text{C}$.
5. This value is guaranteed by design hence it is not included in the production test.

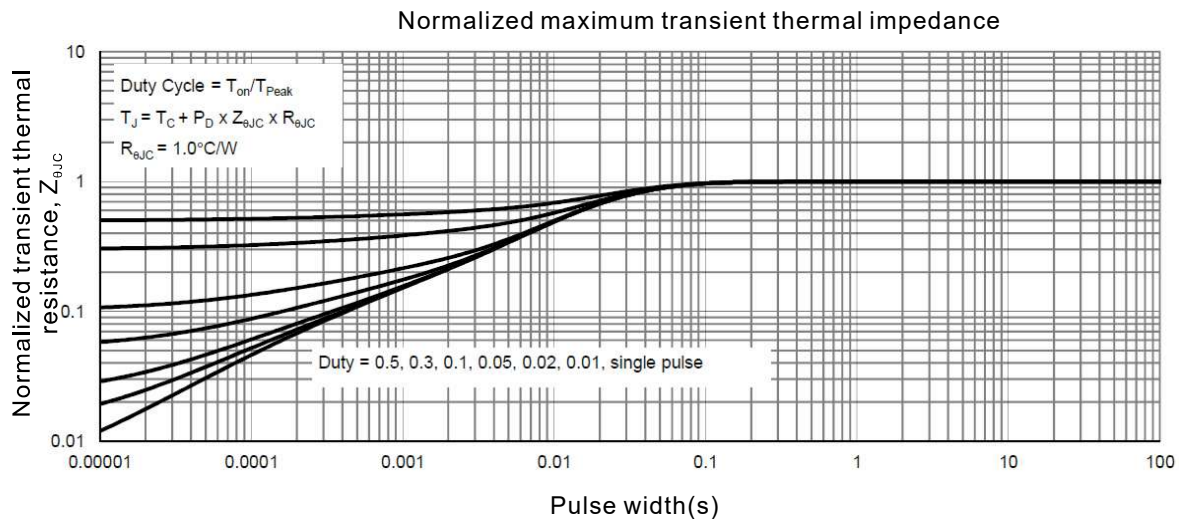
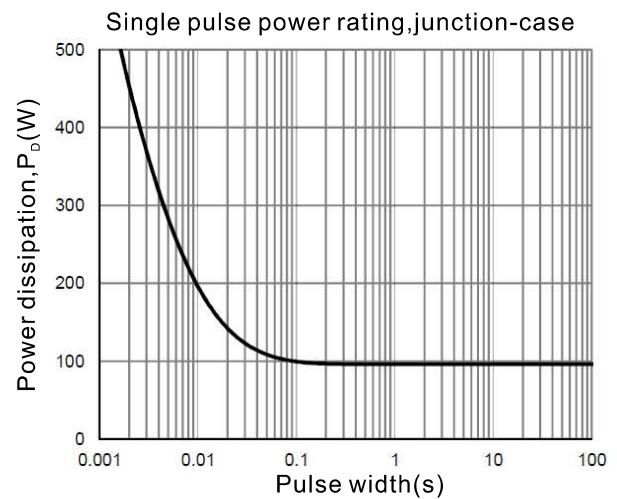
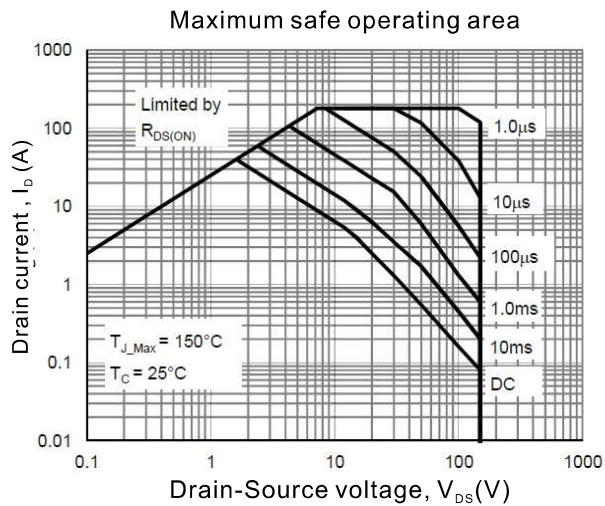
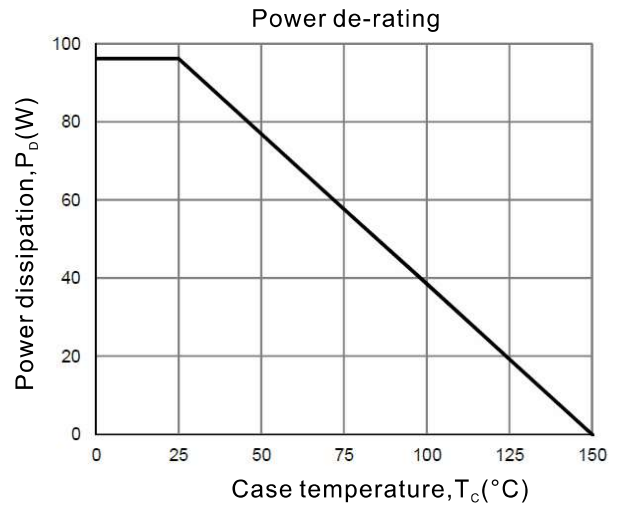
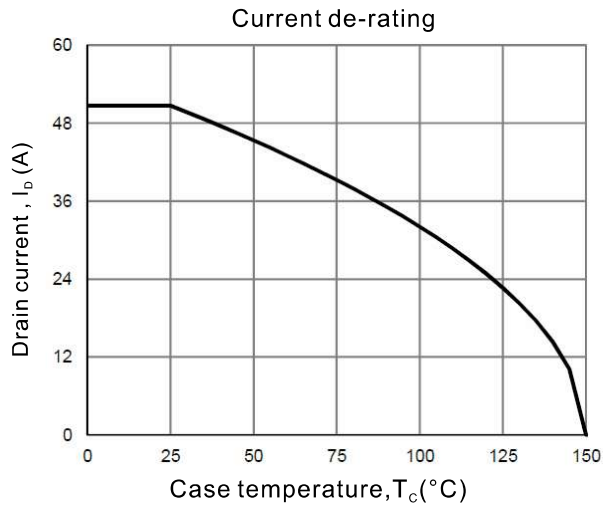
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Rating and characteristic curves



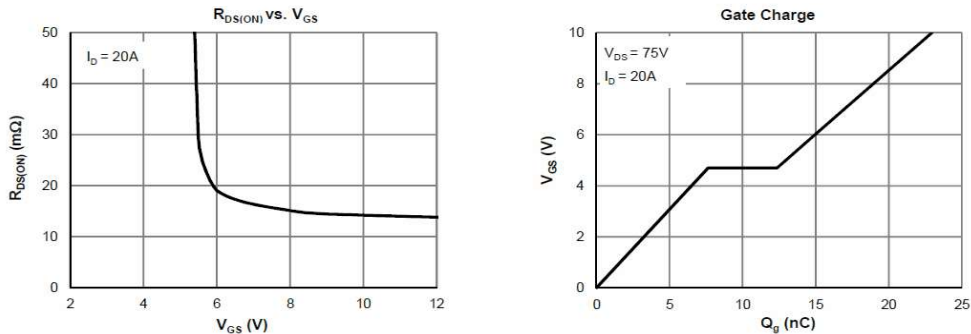
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Rating and characteristic curves



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Rating and characteristic curves



Pinning information

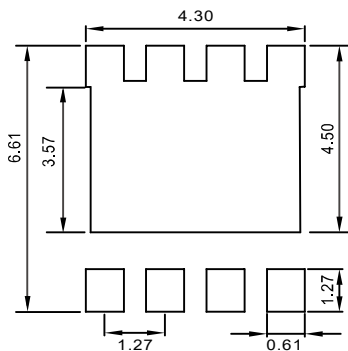
Pin	Simplified outline	Symbol
Pin 1, 2, 3, Source Pin 4 Gate Pin 5, 6, 7, 8 Drain		

Marking

Type number	Marking code
FMOSAC51N15	

Note : "ΣΣΣΣΣ" is internal control code.

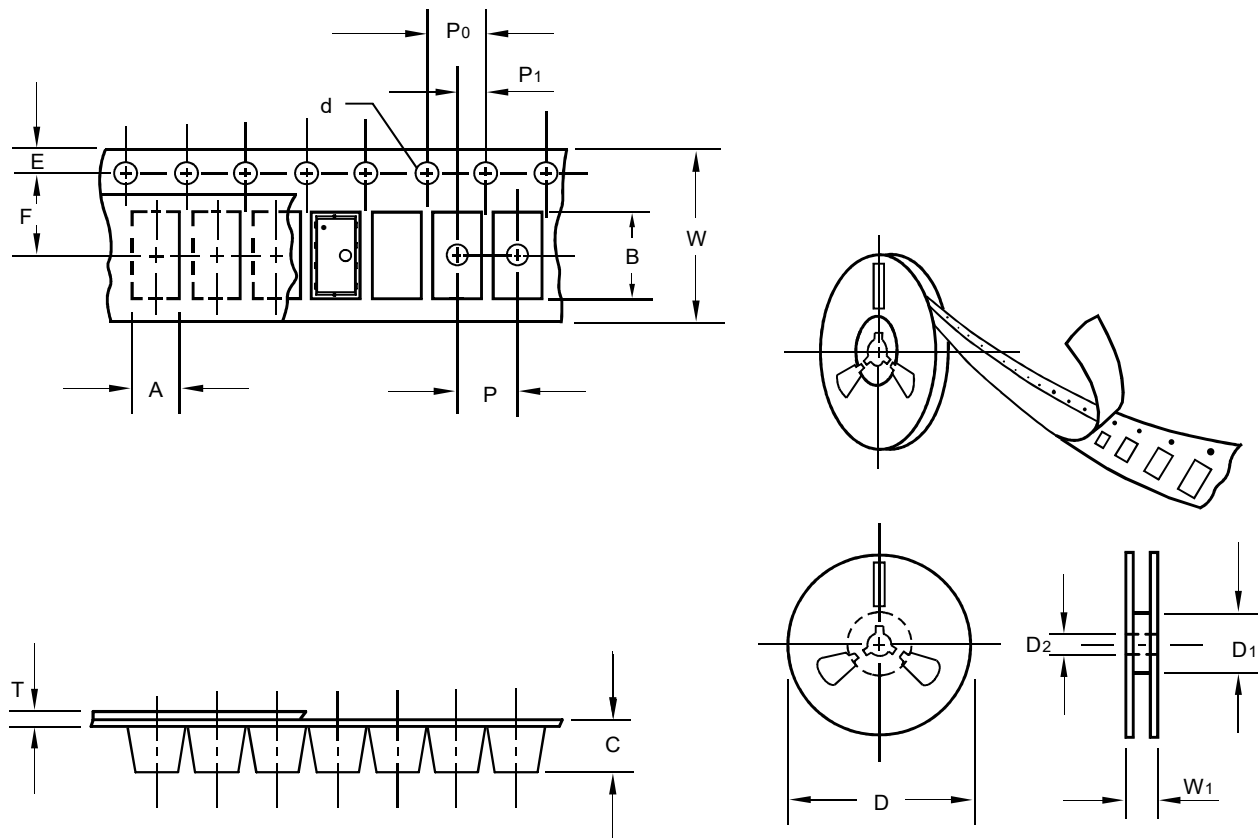
Suggested solder pad layout



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

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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 accor dance with EIA standar RS-481-A and specifications listed above.

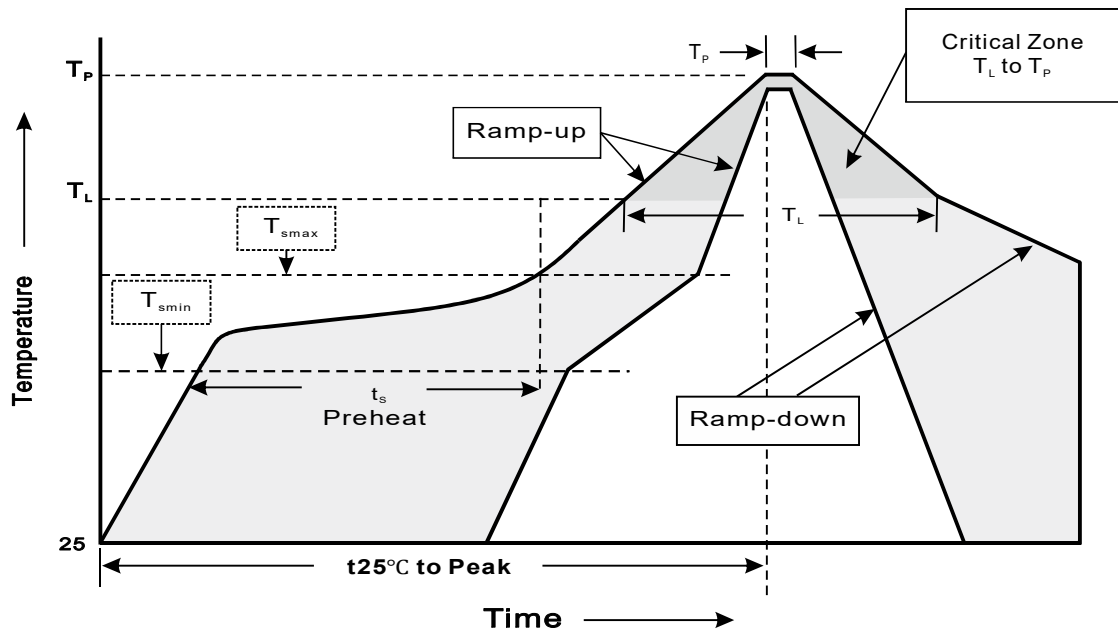
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Reel packing

Device	Outline	Device Package	Reel Size	Reel (pcs)
FMOSAC51N15	Taping	T5060P8	13 inch	5000

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