

FMOSAB99N04

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FMOSAB99N04

99A 40V N-Channel Enhancement Mode Power MOSFET

Features

- $V_{DS}=40V$, $I_D=99A$.
- $R_{DS(ON)} \leq 3.1 m\Omega$, @ $V_{GS}=10V$, $I_D=20V$.
- $R_{DS(ON)} \leq 4.6 m\Omega$, @ $V_{GS}=4.5V$, $I_D=15V$.
- Ultra-low on-resistance and low gate charge.
- 100% UIS and R_g tested.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates halogen free part, ex: FMOSAB99N04-H.

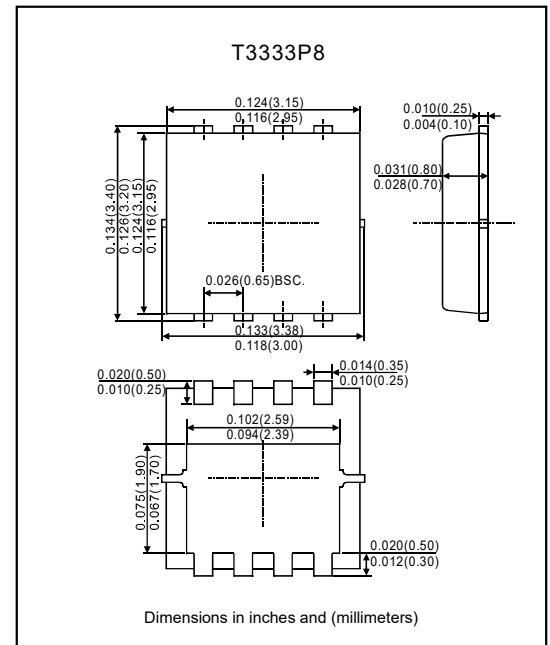
Applications

- Power management in computing, CE, IE 4.0, communications.
- Current switching in DC/DC & AC/DC (SR) sub-systems.
- Load switching, quick/wireless charging, motor driving.

Mechanical data

- Epoxy: UL94-V0 rated flame retardant.
- Case : Molded plastic, T3333P8.
- Mounting Position : Any.

Package outline



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

Parameter	Symbol	Ratings	Units
Drain-Source voltage	V_{DS}	40	V
Gate-Source voltage	V_{GS}	± 20	V
Continuous drain current (Note1)	I_D	99	A
		63	
Pulsed drain current (Note2)	I_{DM}	397	A
Single pulsed avalanche current (Note3)	I_{AS}	23	A
Single pulsed avalanche energy (Note3)	E_{AS}	79	mJ
Power dissipation (Note4)	P_D	52	W
		21	
Thermal resistance, Junction to ambient	$R_{\theta JA}$	85	$^\circ C/W$
Thermal resistance, Junction to case	$R_{\theta JC}$	2.4	$^\circ C/W$
Operating junction temperature	T_J	+150	$^\circ C$
Storage temperature range	T_{STG}	-55 to +150	$^\circ C$

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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}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	40			V
Drain-Source leakage current	I_{DSS}	$V_{DS}=32\text{V}$, $V_{GS}=0\text{V}$			1	μA
		$V_{DS}=32\text{V}$, $V_{GS}=0\text{V}$, $T_J=55^{\circ}\text{C}$			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	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1.2	1.6	2.5	V
Static drain-source on-resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=20\text{A}$		2.5	3.1	m Ω
		$V_{GS}=4.5\text{V}$, $I_D=15\text{A}$		3.5	4.6	
Forward transconductance	g_{FS}	$V_{DS}=5\text{V}$, $I_D=20\text{A}$		123		S

Dynamic characteristics (Note 5)

Input capacitance	C_{iss}	$V_{DS}=20\text{V}$, $V_{GS}=0\text{V}$, $f=1.0\text{MHz}$		1424		pF
Output capacitance	C_{oss}			927		
Reverse transfer capacitance	C_{rss}			48		
Gate resistance	R_g	$V_{DS}=0\text{V}$, $V_{GS}=0\text{V}$, $f=1.0\text{MHz}$		4.6		Ω

Switching characteristics (Note 5)

Total gate charge	Q_g	$V_{GS}=10\text{V}$, $V_{DS}=20\text{V}$, $I_D=20\text{A}$		22		nC
		$V_{GS}=4.5\text{V}$, $V_{DS}=20\text{V}$, $I_D=20\text{A}$		10.8		
Gate-Source charge	Q_{gs}	$V_{GS}=0$ to 10V , $V_{DS}=20\text{V}$, $I_D=20\text{A}$		3.5		
Gate-Drain Charge	Q_{gd}			2.7		
Turn-on delay time	$t_{d(on)}$	$V_{DS}=20\text{V}$, $V_{GS}=10\text{V}$, $R_L=1\Omega$, $R_G=6\Omega$		4.4		ns
Turn-on rise time	t_r			5.7		
Turn-off delay time	$t_{d(off)}$			34		
Turn-off fall time	t_f			22		

Drain-Source diode characteristics and maximum ratings

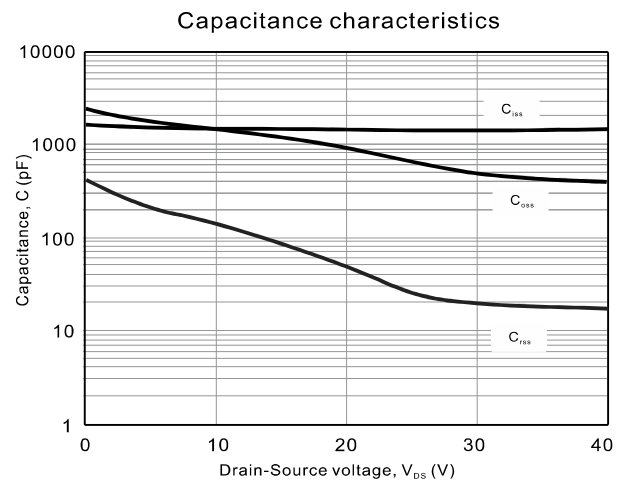
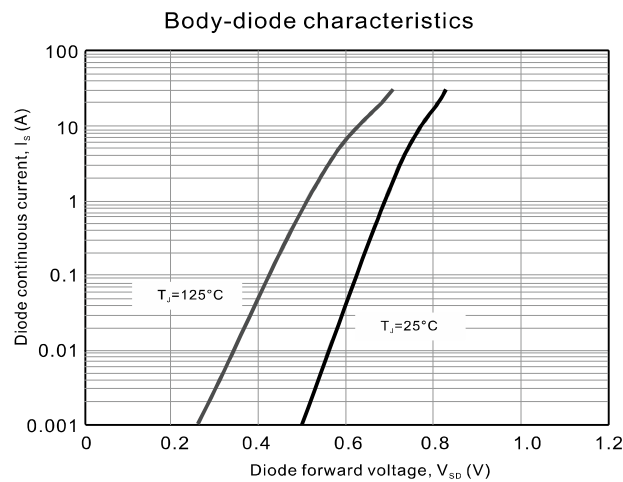
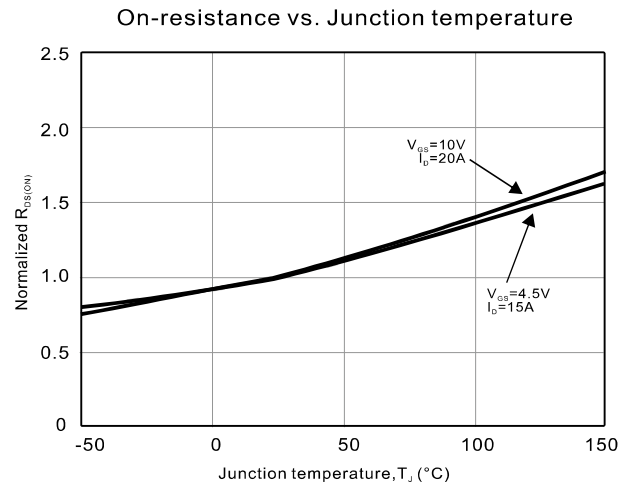
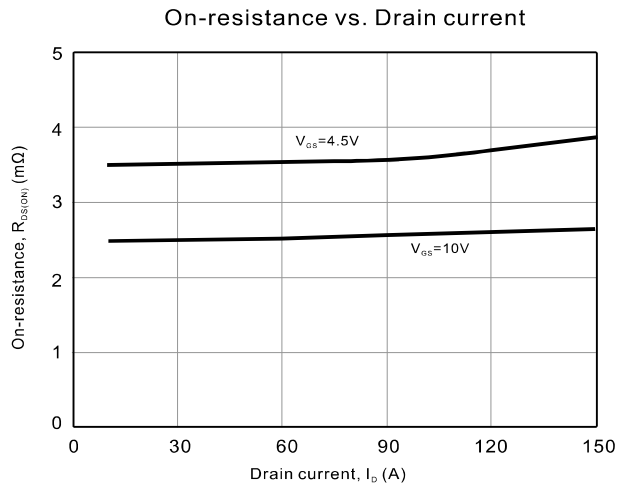
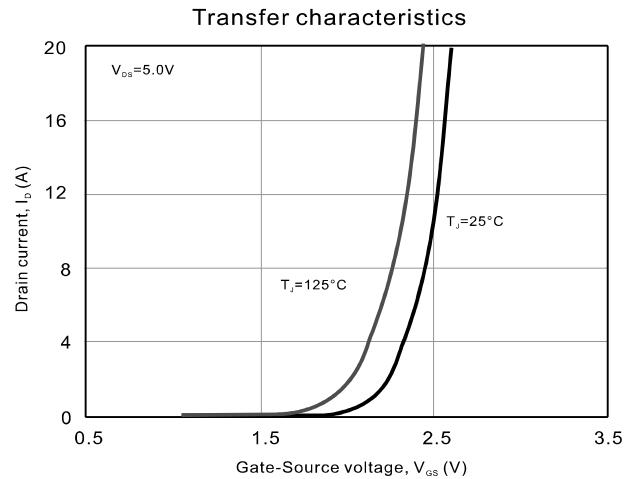
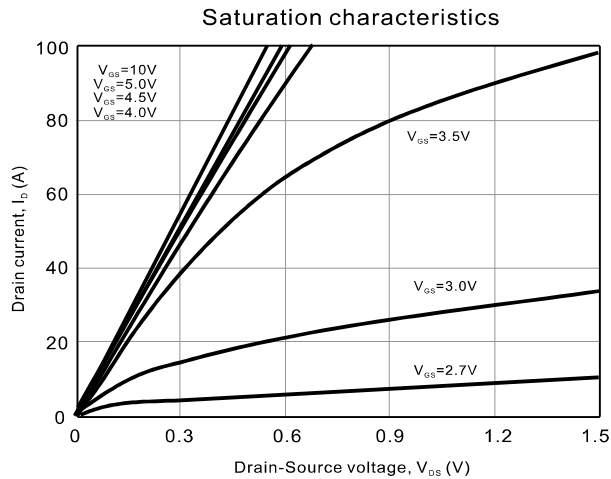
Maximum continuous drain-source forward current	I_S	$T_C=25^{\circ}\text{C}$			52	A
Drain-Source diode forward voltage	V_{SD}	$V_{GS}=0\text{V}$, $I_S=1\text{A}$		0.7	1.0	V
Body diode reverse recovery time	t_{rr}	$I_F=15\text{A}$, $dI_F/dt=100\text{A}/\mu\text{s}$		27		ns
Body diode reverse recovery charge	Q_{rr}			12		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 [$L = 300\mu\text{H}$, $V_{GS} = 10\text{V}$, $V_{DS} = 20\text{V}$] 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.

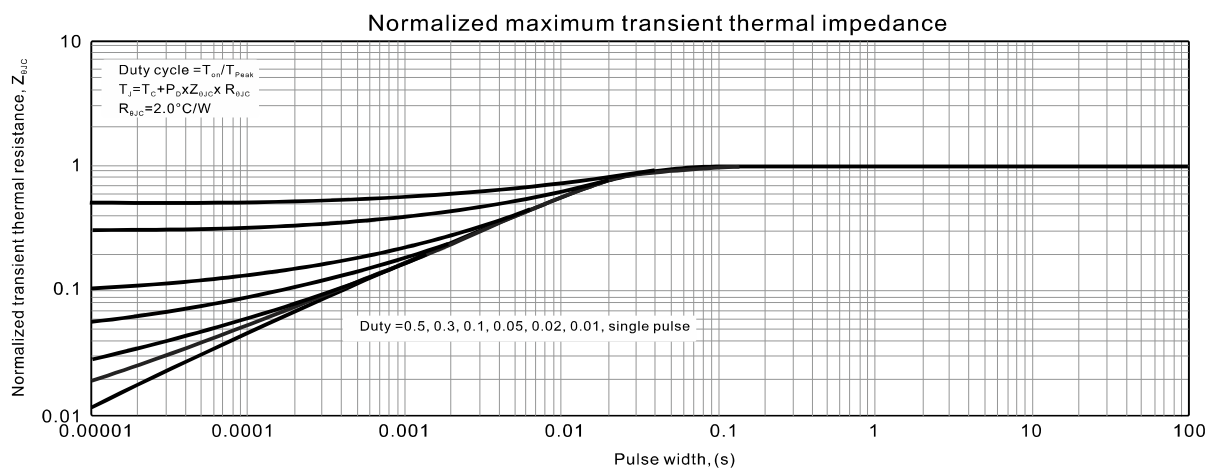
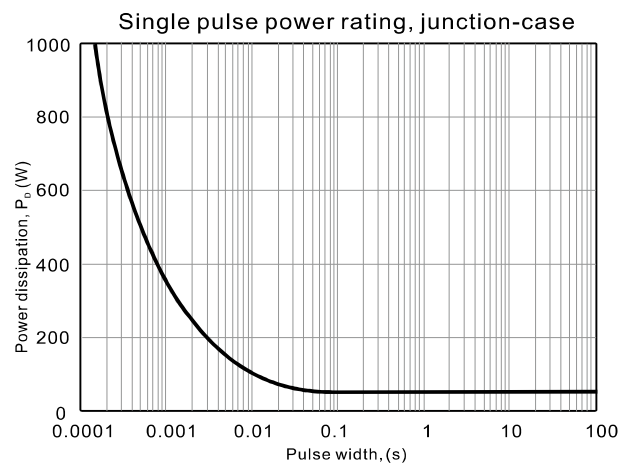
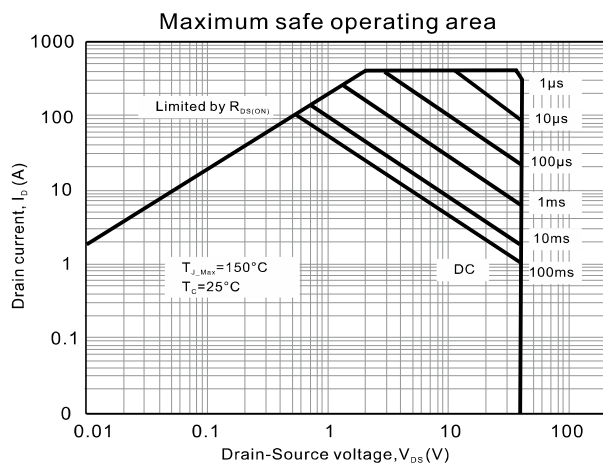
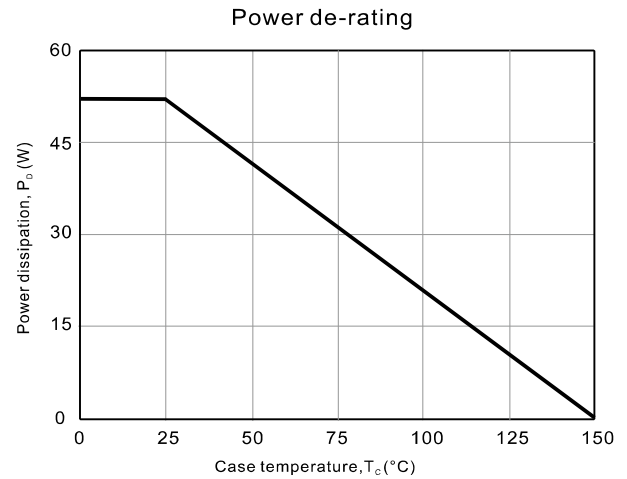
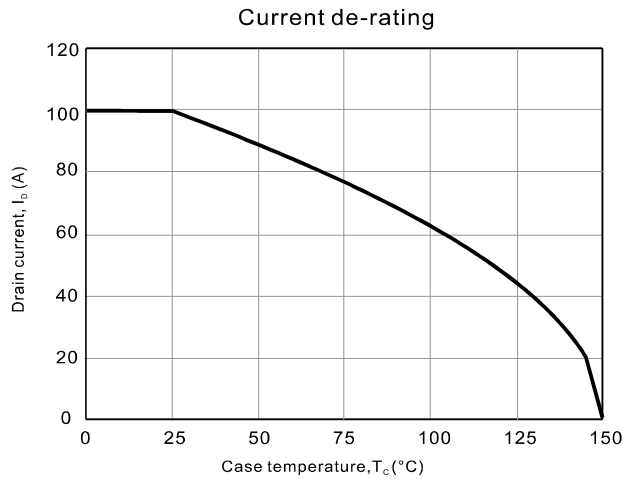
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Rating and characteristic curves



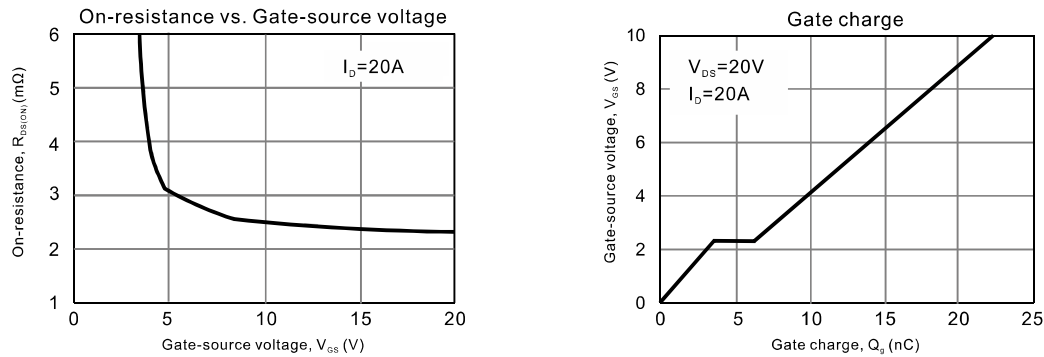
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Rating and characteristic curves



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Rating and characteristic curves



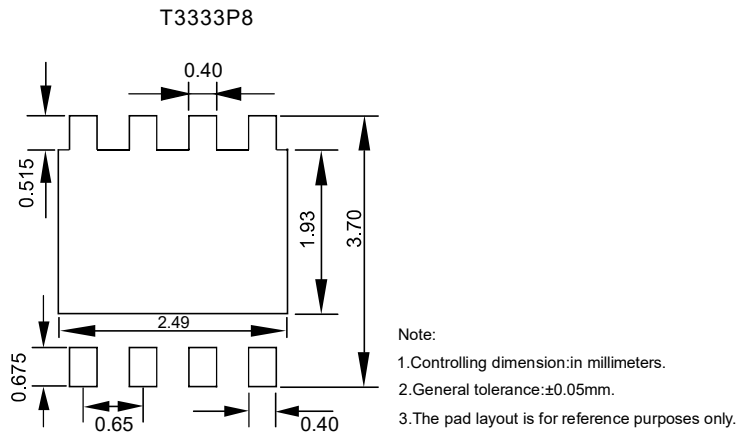
Pinning information

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

Marking

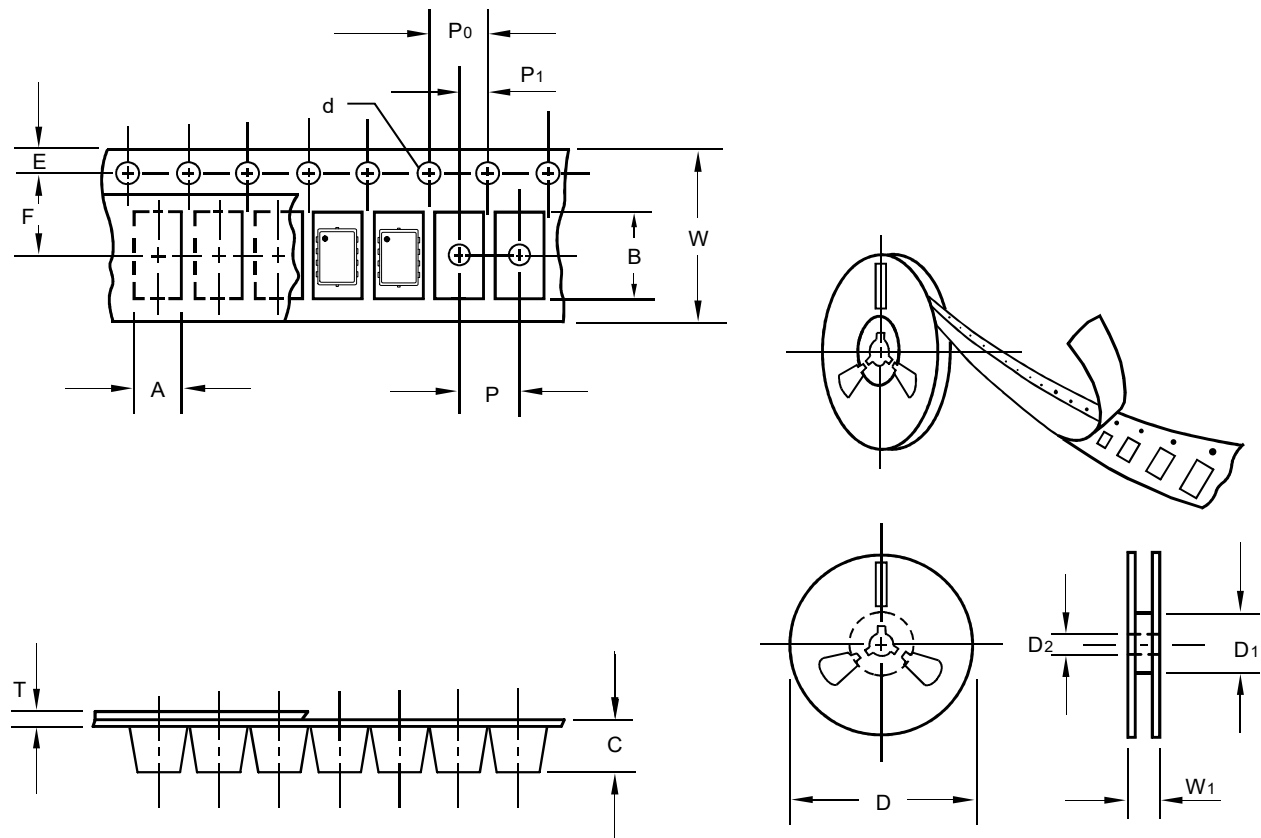
Type number	Marking code
FMOSAB99N04	SL0403A

Suggested solder pad layout



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Packing information



unit:mm

Item	Symbol	Tolerance	T3333P8
Carrier width	A	0.1	3.55
Carrier length	B	0.1	3.55
Carrier depth	C	0.1	1.10
Sprocket hole	d	0.1	1.50
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	0.23
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.

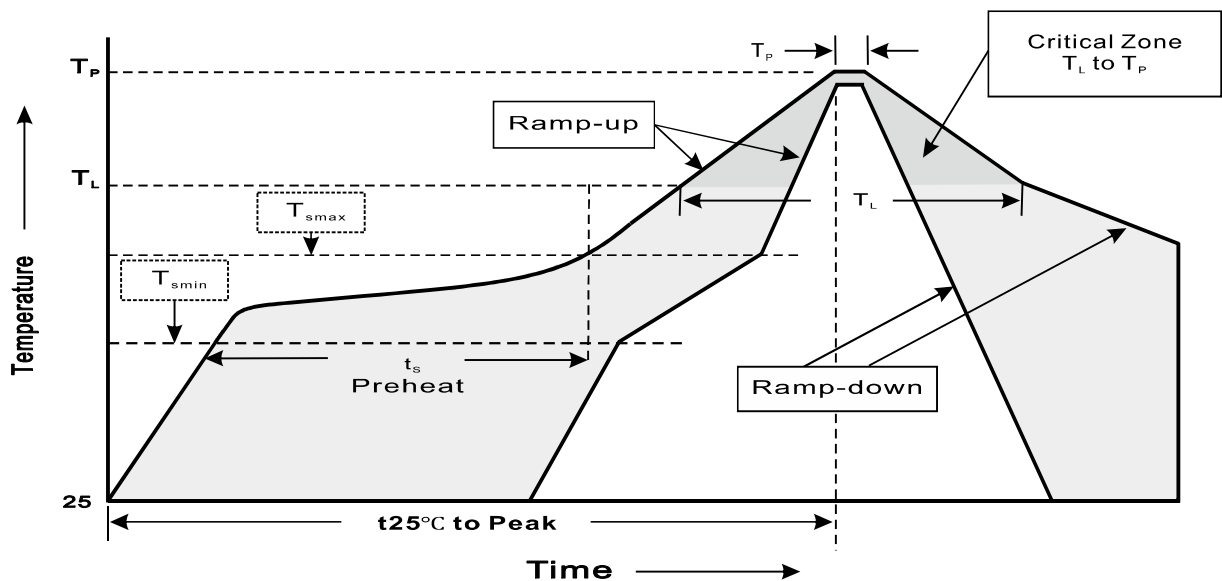
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Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)
T3333P8	13"	5,000	8.0	10,000	355*335*38	330	350*330*360	80,000

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)	$< 3^\circ\text{C}/\text{sec}$
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	$< 3^\circ\text{C}/\text{sec}$
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	$< 6^\circ\text{C}/\text{sec}$
Time 25°C to peak temperature	< 6 minutes