FMOS3439KDW1

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N-Channel And P-Channel Enhancement Mode MOSFET ESD Protection

Features

- N-Channel : 20V / 0.75A.
  $R_{DS(ON)}$ ≤ 380mΩ, @V_{GS}=4.5V, I_D=0.65A.
  $R_{DS(ON)}$ ≤ 450mΩ, @V_{GS}=2.5V, I_D=0.55A.
  $R_{DS(ON)}$ ≤ 800mΩ, @V_{GS}=1.8V, I_D=0.45A.
- P-Channel : -20V/-0.66A.
  $R_{DS(ON)}$≤ 520mΩ, @-V_{GS}=4.5V, -I_D=1A.
  $R_{DS(ON)}$ ≤ 780mΩ, @-V_{GS}=2.5V, -I_D=0.8A.
- Low on-resistance.
- Operated at low logic level gate drive.
- Qualified to AEC-Q101 standards for high reliability.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates Halogen-free part, ex.FMOS3439KDW1-H.

Application

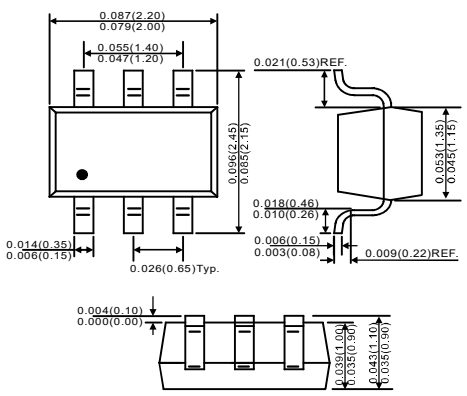
- Load/power switching.
- Interfacing switching.
- Battery management for ultra small portable electronics.

Mechanical data

- Epoxy:UL94-V0 rated flame retardant.
- Case : Molded plastic, SOT-363.
- Terminals : Solder plated, solder able per MIL-STD-750, Method 2026.
- Mounting Position : Any.

Package outline

SOT-363



Dimensions in inches and (millimeters)

Maximum ratings (At T_A=25°C unless otherwise noted)

Parameter	Symbol	Ratings		Unit
		N-Channel	P-Channel	
Drain to source voltage	V_{DS}	20	-20	V
Gate-source voltage	V_{GS}	±8	±12	V
Continuous drain current (Note 1)	I_D	0.75	-0.66	A
Pulsed drain current, t_p=10μs	I_{DM}	1.8	-1.2	A
Thermal resistance, junction to ambient (Note 1)	$R_{\theta JA}$	833		°C/W
Lead temperature for soldering purposes (1/8" from case for 10 seconds)	T_L	+260		°C
Junction temperature	T_J	+150		°C
Storage temperature range	T_{STG}	-55 to + 150		°C

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Electrical characteristics (At T_C=25°C unless otherwise specified)

N-Channel

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static parameters						
Drain-source breakdown voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	20			V
Drain-source leakage current	I_{DSS}	V_{DS}=20V, V_{GS}=0V			1	μA
Gate-source leakage current	I_{GSS}	V_{GS}=±10V, V_{DS}=0V			±20	μA
On characteristics						
Gate threshold voltage (Note2)	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	0.35	0.75	1.1	V
Static drain-source on-state resistance (Note2)	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=0.65A		190	380	mΩ
		V_{GS}=2.5V, I_D=0.55A		260	450	
		V_{GS}=1.8V, I_D=0.45A		390	800	
Forward tranconductance	g_{FS}	V_{DS}=10V, I_D=0.8A		1.6		S
Dynamic parameters (Note4)						
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=16V, f=1.0MHz		79	120	pF
Out capacitance	C_{oss}			13	20	
Reverse transfer capacitance	C_{rss}			9	15	
Switching parameters (Note3,4)						
Turn-on delay time	$t_{d(on)}$	V_{DS}=10V, V_{GS}=4.5V, I_D=0.5A, R_G=10Ω		6.7		ns
Turn-on rise time	t_r			4.8		
Turn-off delay time	$t_{d(off)}$			17.3		
Turn-off fall time	t_f			7.4		
Source-drain diode ratings and characteristics						
Diode forward voltage (Note3)	V_{SD}	I_S=0.15A, V_{GS}=0V			1.2	V

Note :
1. Surface mounted on FR4 board using the minimum recommended pad size.
2. Pulse test : pulse width = 300us, duty cycle =2%.
3. Switching characteristics are independent of operating junction temperature.
4. Guaranteed by design, not subject to producting.

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Electrical characteristics (At T_C=25°C unless otherwise specified)

P-Channel

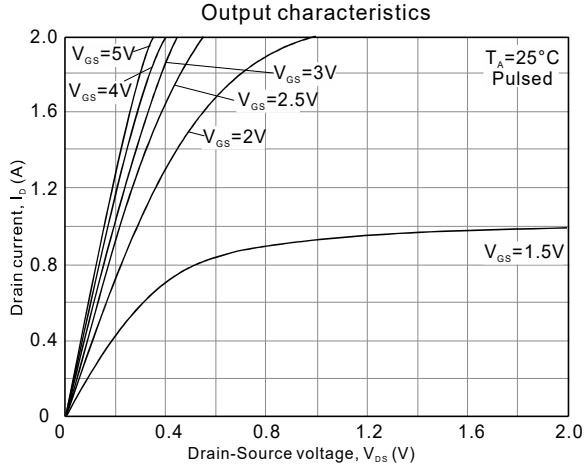
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static parameters						
Drain-source breakdown voltage	$-BV_{DSS}$	$-I_D$=250μA, V_{GS}=0V	20			V
Drain-source leakage current	$-I_{DSS}$	$-V_{DS}$=20V, V_{GS}=0V			1	μA
Gate-source leakage current	I_{GSS}	V_{GS}=±10V, V_{DS}=0V			±20	μA
On characteristics						
Gate threshold voltage (Note2)	$-V_{GS(TH)}$	V_{DS}=V_{GS}, $-I_D$=250μA	0.35	0.6	1.1	V
Static drain-source on-state resistance (Note2)	$R_{DS(ON)}$	$-V_{GS}$=4.5V, $-I_D$=1A		450	520	mΩ
		$-V_{GS}$=2.5V, $-I_D$=0.8A		650	780	
		$-V_{GS}$=1.8V, $-I_D$=0.5A		950		
Forward tranconductance (Note2)	g_{FS}	$-V_{DS}$=10V, $-I_D$=0.54A		1.2		S
Dynamic parameters (Note4)						
Input capacitance	C_{iss}	V_{GS}=0V, $-V_{DS}$=16V, f=1.0MHz		113		pF
Out capacitance	C_{oss}			15		
Reverse transfer capacitance	C_{rss}			9		
Switching parameters (Note3,4)						
Turn-on delay time	$t_{d(on)}$	$-V_{DS}$=10V, $-V_{GS}$=4.5V, $-I_D$=0.2A, R_G=10Ω		9		ns
Turn-on rise time	t_r			5.7		
Turn-off delay time	$t_{d(off)}$			32.6		
Turn-off fall time	t_f			20.3		
Source-drain diode ratings and characteristics						
Diode forward voltage	$-V_{SD}$	$-I_S$=0.5A, V_{GS}=0V			1.2	V

Note :
1. Surface mounted on FR4 board using the minimum recommended pad size.
2. Pulse test : pulse width = 300us, duty cycle =2%.
3. Switching characteristics are independent of operating junction temperature.
4. Guaranteed by design, not subject to producting.

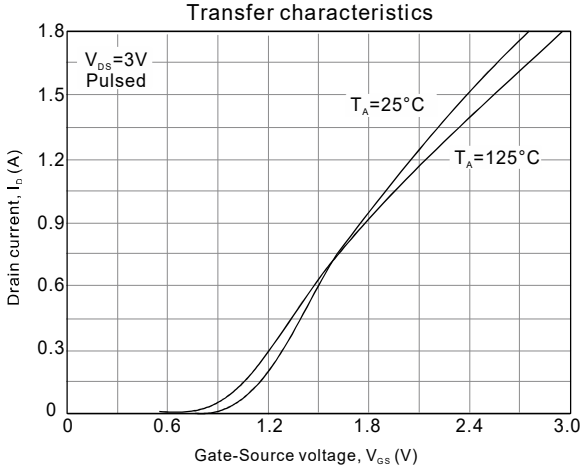
FMOS3439KDW1

Typical performance characteristics (N-Channel)

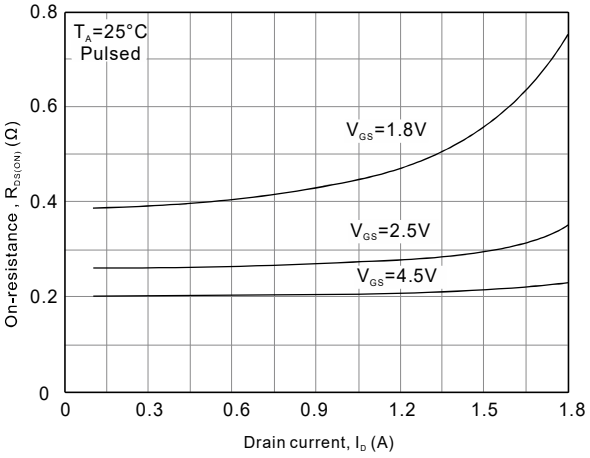
Output characteristics



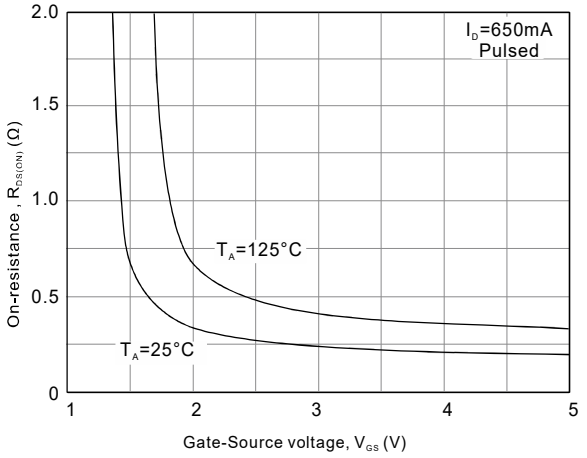
Transfer characteristics



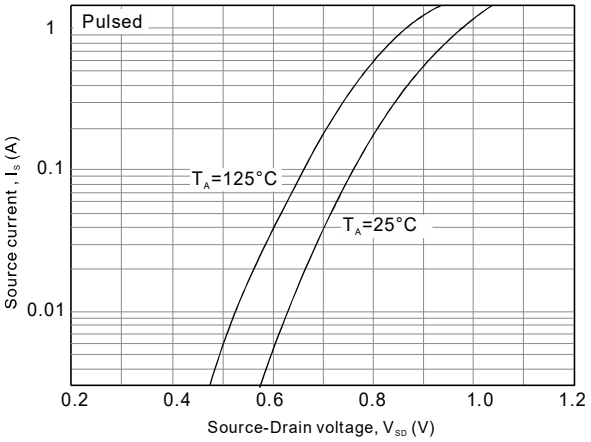
On-resistance vs. Drain current



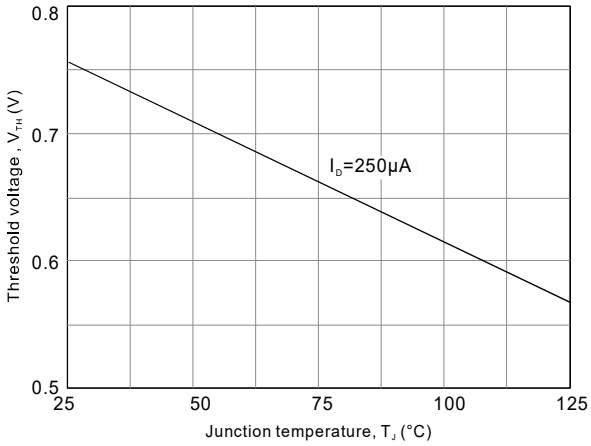
On-resistance vs. Gate-Source voltage



Source current vs. Source-Drain voltage



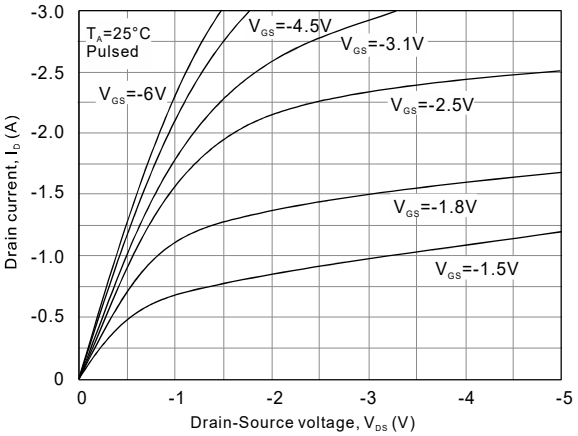
Threshold voltage



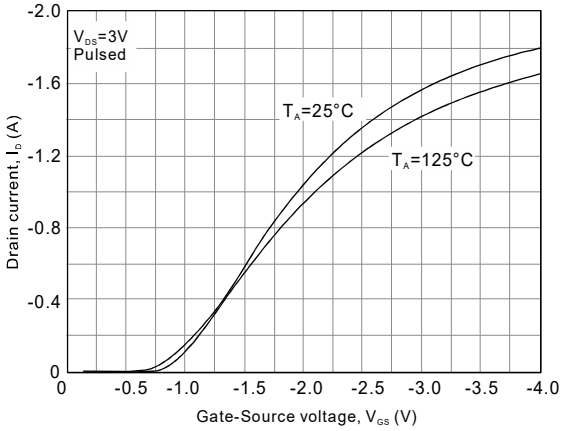
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Typical performance characteristics (P-Channel)

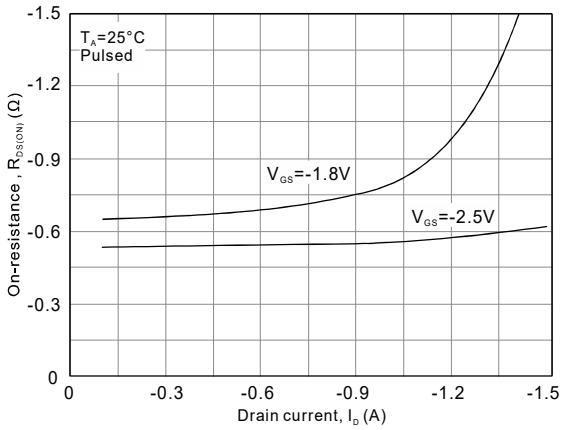
Output characteristics



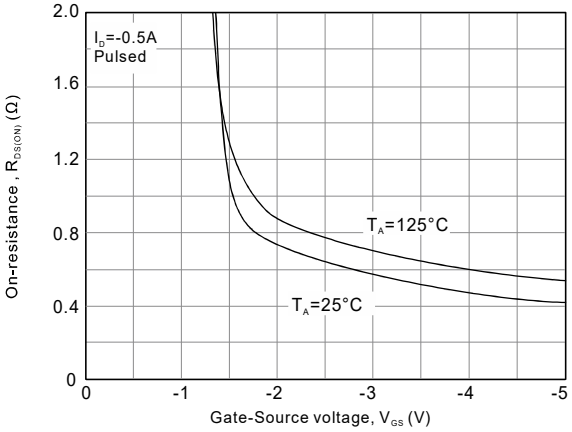
Transfer characteristics



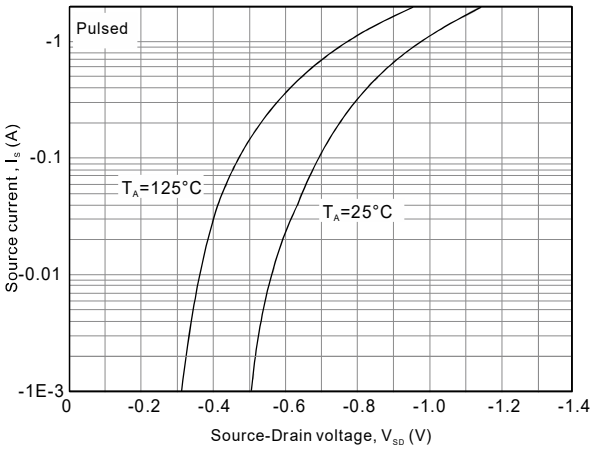
On-resistance vs. Drain current



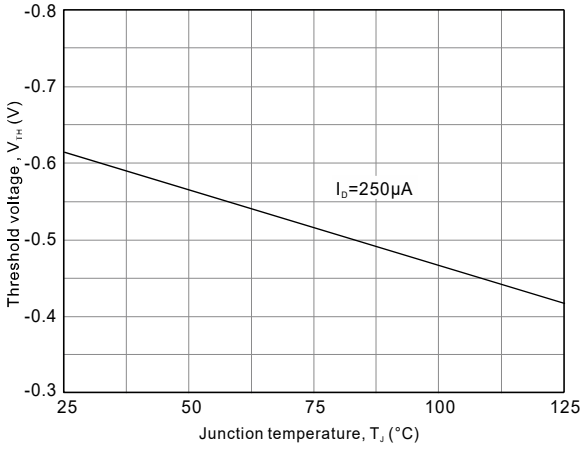
On-resistance vs. Gate-Source voltage



Source current vs. Source-Drain voltage

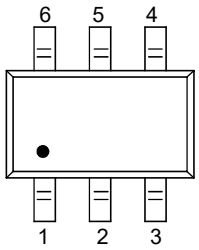
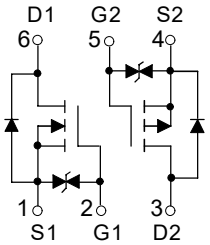


Threshold voltage



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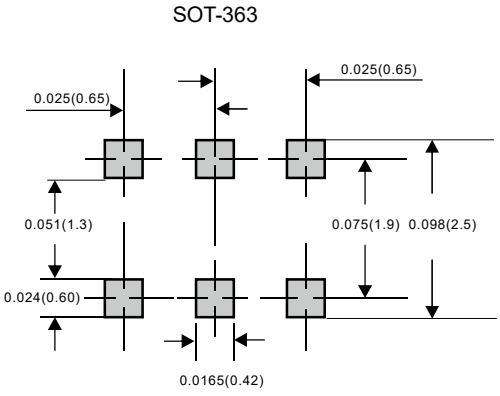
Pinning information

Pin	Simplified outline	Symbol
Pin1 Source1 Pin2 Gate1 Pin3 Drain2 Pin4 Source2 Pin5 Gate2 Pin6 Drain1		

Marking

Type number	Marking code
FMOS3439KDW1	49K

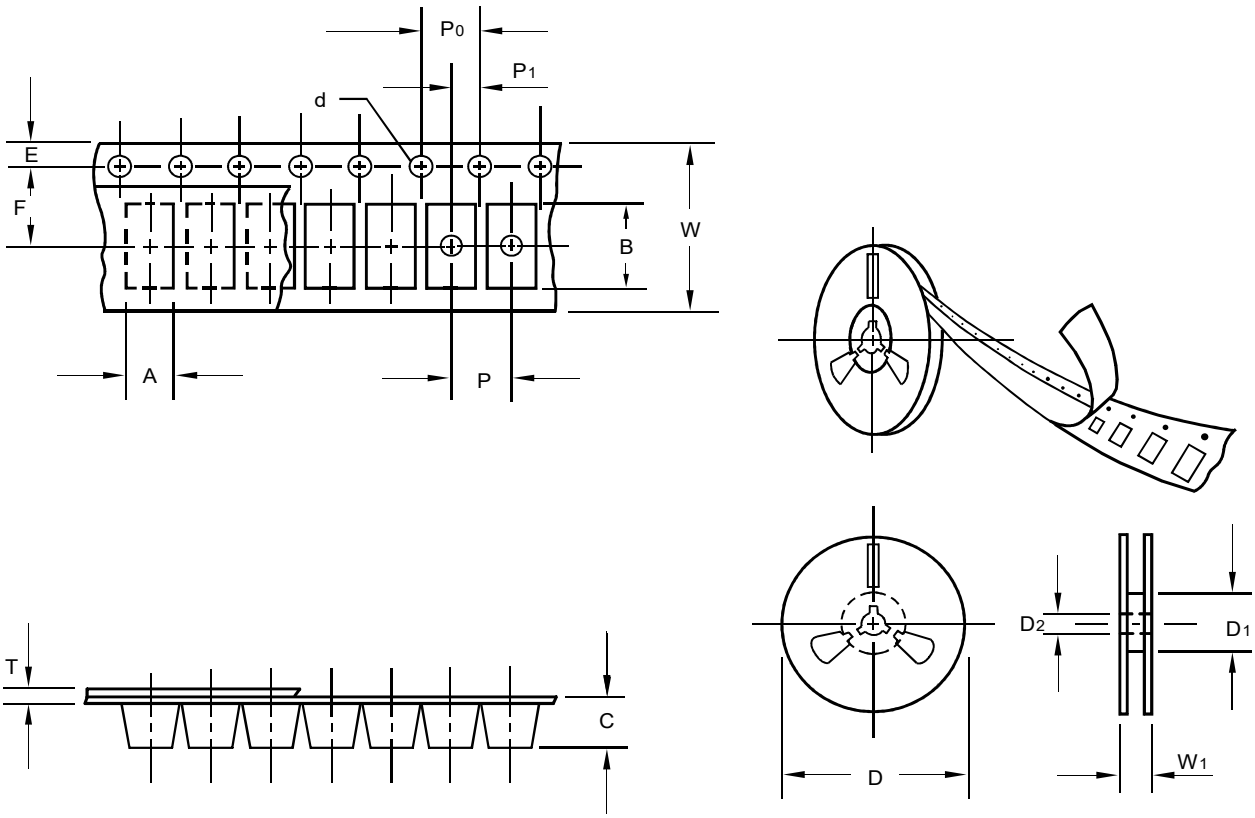
Suggested solder pad layout



Dimensions in inches and (millimeters)

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Packing information



unit:mm

Item	Symbol	Tolerance	SOT-363
Carrier width	A	0.2	2.25
Carrier length	B	0.2	2.55
Carrier depth	C	0.1	1.22
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D_1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D_1	min	62.00
Feed hole diameter	D_2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	4.00
Sprocket hole pitch	P_0	0.1	4.00
Embossment center	P_1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W_1	1.0	11.40

Note:Devices are packed in accor dance with EIA standar RS-481-A and specifications listed above.

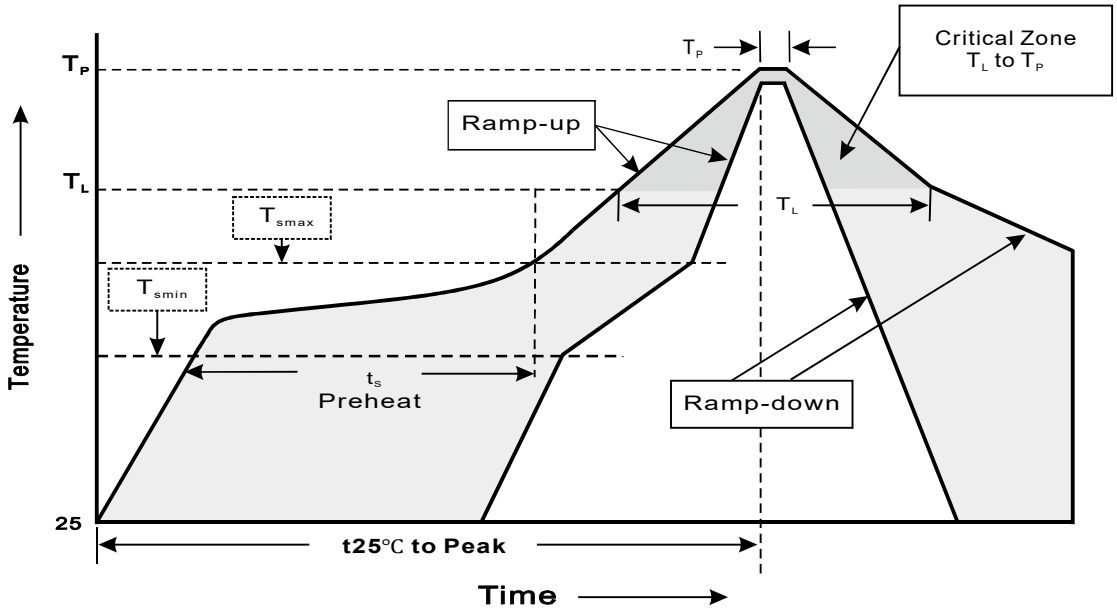
FMOS3439KDW1

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)
SOT-363	7"	3,000	4.0	30,000	183*183*123	178	382*262*387	240,000

Suggested thermal profiles for soldering processes

1.Storage environment : Temperature=5℃~40℃ 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℃/sec
Prehaeat -Temperature Min (T_{smin}) -Temperature Max (T_{smax}) -Time (min to max) (t_S)	 150℃ 200℃ 60 ~120sec
T_{smax} to T_L -Ramp-up rate	< 3℃/sec
Time maintained above: -Temperature (T_L) -Time(T_L)	 217℃ 60 ~ 260 sec
Peak Temperature(T_P)	255℃ -0/+5℃
Time within 5℃ of actual peak Temperature(T_P)	10 ~ 30sec
Ramp-down rate	< 6℃/sec
Time 25℃ to peak temperature	< 6 minutes