FMOSAT27DN10-Q1-H

List

List.....1

Package outline.....2

Features.....2

Application.....2

Mechanical data.....2

Maximum ratings 2

Thermal Performance.....2

Electrical characteristics.....3

Rating and characteristic curves.....4~6

Pinning information.....7

Marking.....7

Suggested solder pad layout.....7

Packing information.....8

Reel Packing.....9

Suggested thermal profiles for soldering processes.....9

High reliability test capabilities.....10

FMOSAT27DN10-Q1-H

59A 100V Dual N-Channel Enhancement Mode Power MOSFET

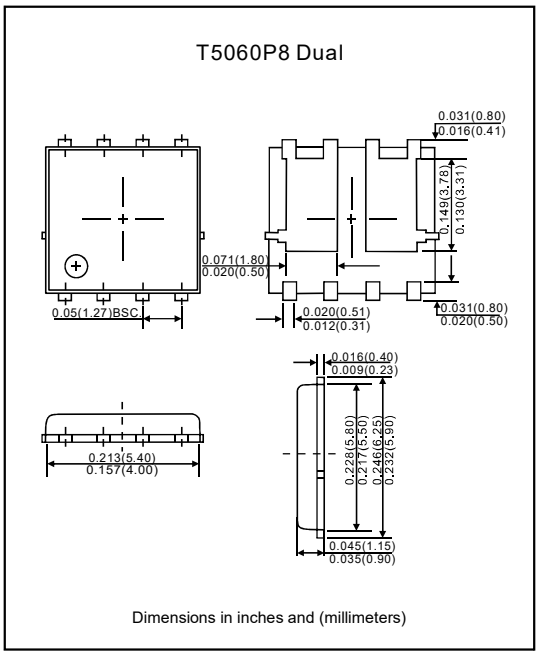
Features

- V_{DS}=100V, I_D=59A.
- $R_{DS(ON)}$≤ 18mΩ @ V_{GS}=10V, I_D=20A.
- $R_{DS(ON)}$≤ 25mΩ @ V_{GS}=4.5V, I_D=15A.
- Ultra low on-resistance,$R_{DS(ON)}$.
- Low gate charge,Q_G.
- 100% UIS and ΔV_{ds} tested.
- Qualified to AEC-Q101 standards for high reliability.
- Lead-free parts meet RoHS requirements.

Mechanical data

- Epoxy:UL94-V0 rated flame retardant.
- Case : Molded plastic, T5060P8 Dual (DFN5060-8 Dual).
- Weight : Approximated 105mg.

Package outline



Maximum ratings (At T_C=25°C unless otherwise specified)

Parameter	Symbol	Ratings	Unit
Drain-source voltage	V_{DS}	100	V
Gate-source voltage	V_{GS}	±20	
Continuous drain current (T_C=25°C)	I_D	59	A
Continuous drain current (T_C=100°C)		42	
Pulse drain current tested (note 1)	I_{DM}	Refer to fig. 4	A
Avalanche energy (note 2)	E_{AS}	44	mJ
Maximum power dissipation (T_C=25°C)	P_D	125	W
Maximum power dissipation (T_C=100°C)		63	
Thermal resistance, junction to ambient (note 3)	$R_{\theta JA}$	46	°C/W
Thermal resistance, junction to case	$R_{\theta JC}$	1.2	°C/W
Maximum junction temperature	T_J	+175	°C
Storage temperature range	T_{STG}	-55 to +175	°C

FMOSAT27DN10-Q1-H

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

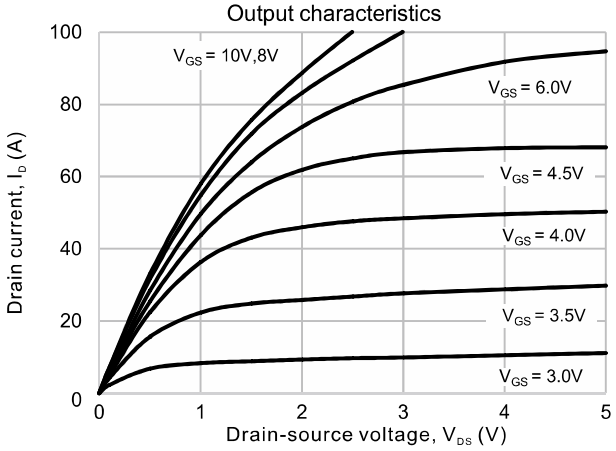
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off characteristics						
Drain-source breakdown voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	100			V
Drain-source leakage current	I_{DSS}	V_{DS}=80V, V_{GS}=0V			1	μA
Gate-source leakage current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V			±100	nA
On characteristics						
Gate threshold voltage	$V_{GS(TH)}$	V_{DS}=$V_{GS,}$ I_D=250μA	1.2	1.6	2.1	V
Static drain-source on-state resistance (Note 4)	$R_{DS(ON)}$	V_{GS}=10V, I_D=20A		14	18	mΩ
		V_{GS}=4.5V, I_D=15A		19	25	mΩ
Dynamic parameters						
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=50V, f=1.0MHz	725	1015	1370	pF
Out capacitance	C_{oss}		254	356	480	
Reverse transfer capacitance	C_{rss}		13	19	25	
Gate resistance	R_g	f=1.0MHz		1.6		Ω
Switching parameters (Note 5)						
Total gate charge	Q_g	V_{GS}=0 to 10V, V_{DS}=50V, I_D=20A	13	18	24	nC
Gate to source charge	Q_{gs}			3.9		
Gate to drain charge	Q_{gd}			4.4		
Turn-on delay time	$t_{d(on)}$	V_{DD}=50V, V_{GS}=10V, R_{GEN}=3Ω, I_D=20A		7.2		ns
Rise time	t_r			18		
Turn-off delay time	$t_{d(off)}$			19		
Fall time	t_f			5.3		
Source-drain diode ratings and characteristics (Note 5)						
Drain-source diode forward voltage	V_{SD}	I_S=20A, V_{GS}=0V			1.2	V
Continuous body diode forwardcurrent	I_S				59	A
Pulsed body diode forward current	I_{SM}				237	A
Reverse recovery time	t_{rr}	I_F=15A, di/dt=100A/μs	23	33	44	ns
Reverse recovery charge	Q_{rr}			29		nC

Notes : 1. Repetitive rating: pulse width limited by maximum junction temperature.
2. EAS condition: starting T_J=25ºC, V_{DD}=50V, V_G=10V, R_G=25Ω, L=0.5mH, I_{AS}=13.3A, V_{DD}=0V, during time in avalanche.
3. $R_{\theta JA}$ is measured with the device mounted on a 1 $inch^2$ pad of 2oz copper FR4 PCB.
4. Pulse test: pulse width ≤ 300s,duty cycle ≤ 0.5%.

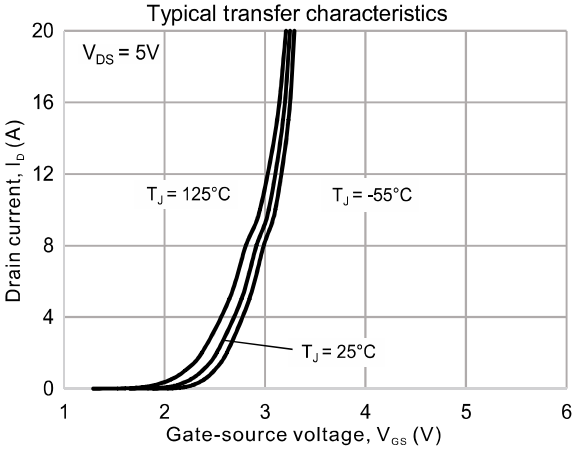
FMOSAT27DN10-Q1-H

Rating and characteristic curves

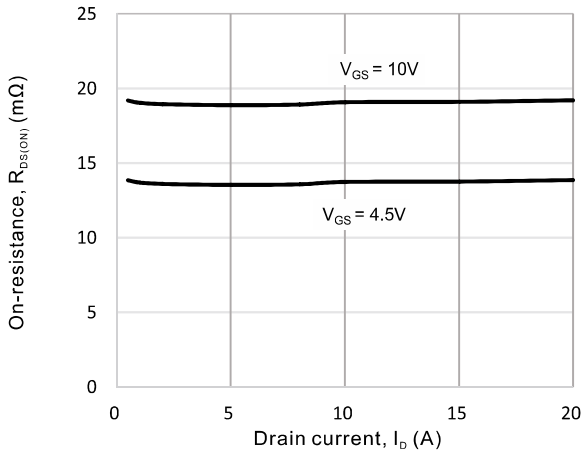
Output characteristics



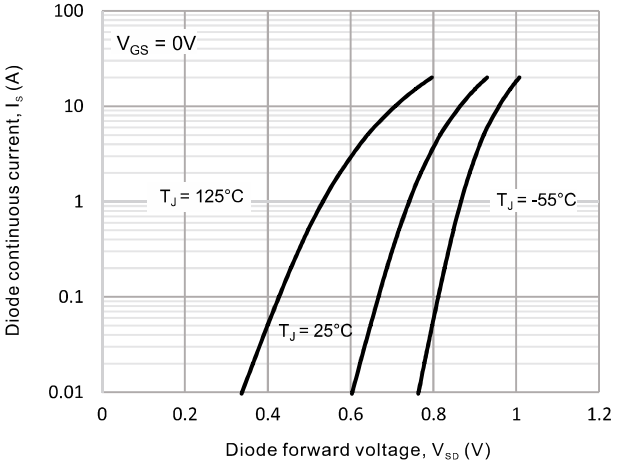
Typical transfer characteristics



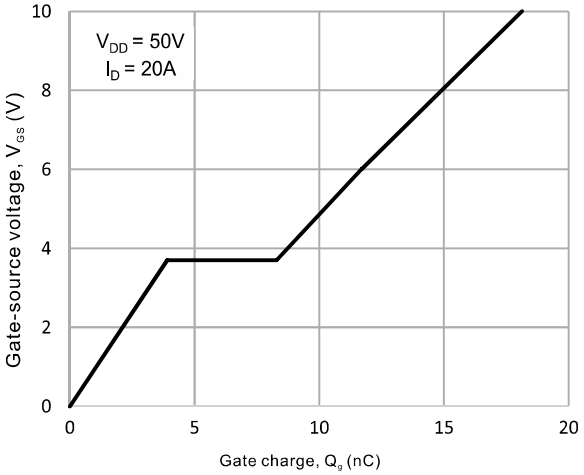
On-resistance vs. Drain current



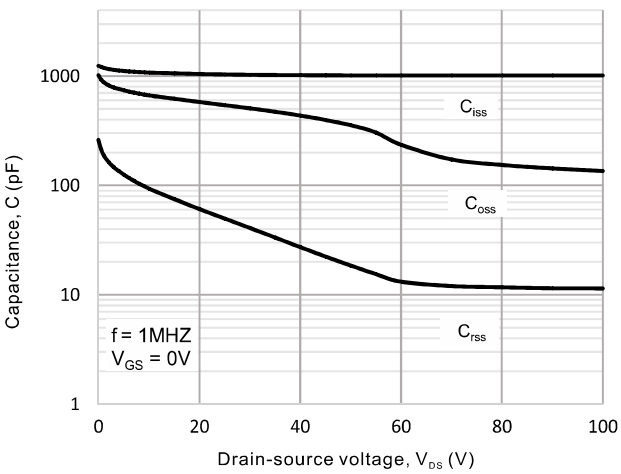
Body diode characteristics



Gate charge characteristics



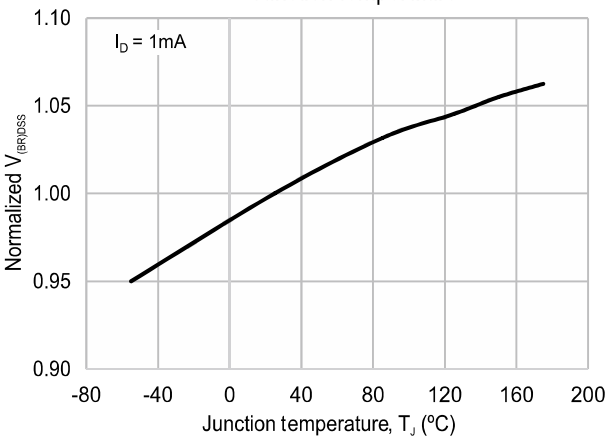
Capacitance characteristics



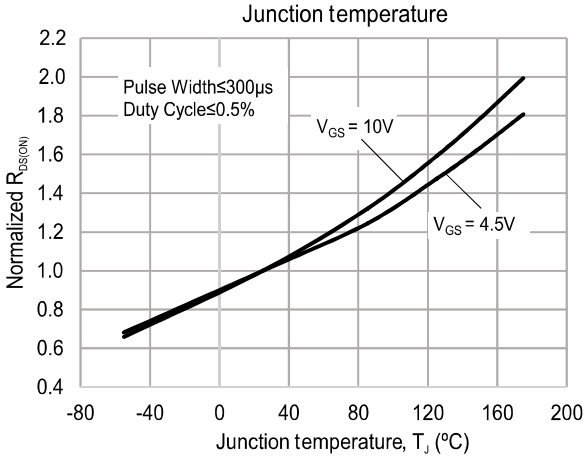
FMOSAT27DN10-Q1-H

Rating and characteristic curves

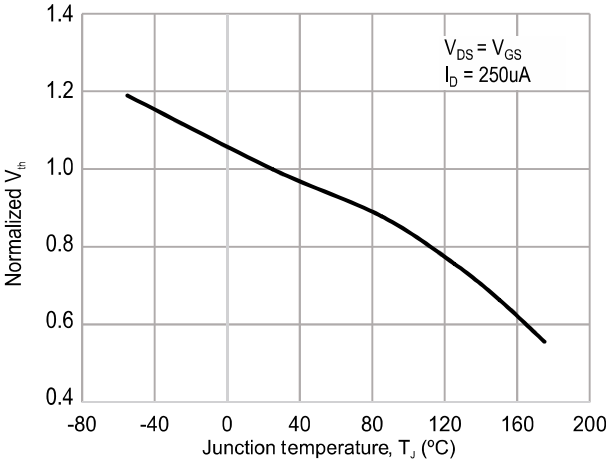
Normalized breakdown voltage vs. Junction temperature



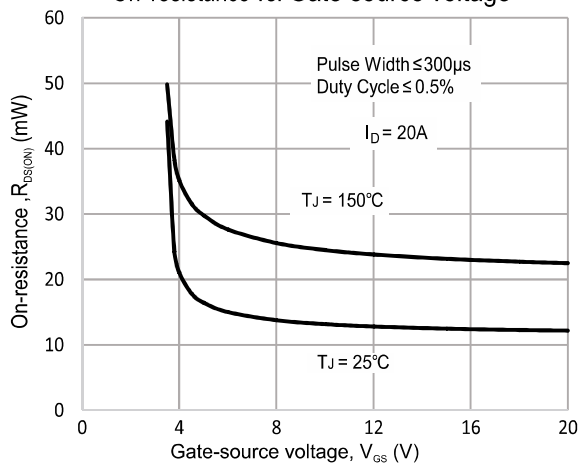
Normalized on-resistance vs. Junction temperature



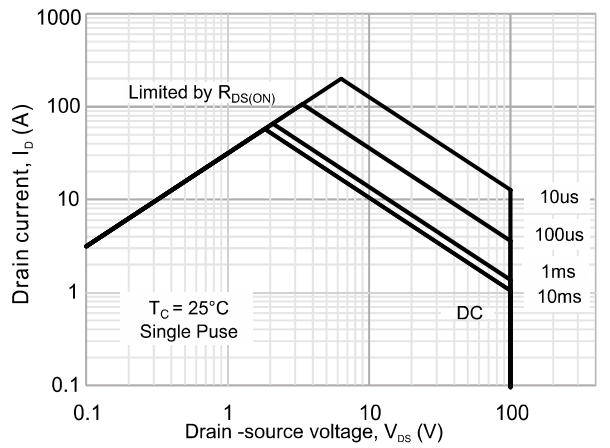
Normalized threshold voltage vs. Junction temperature



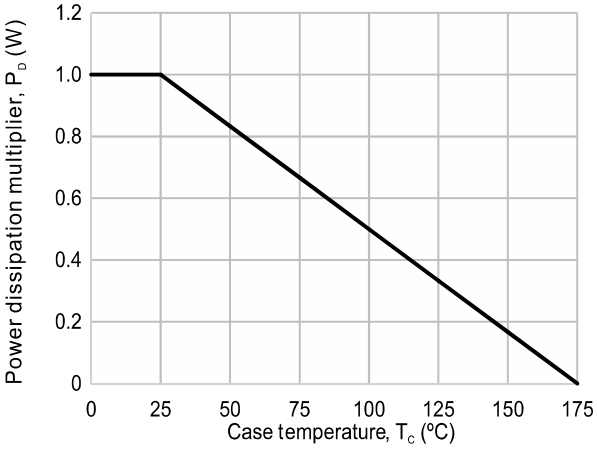
On-resistance vs. Gate-source voltage



Maximum safe operating area

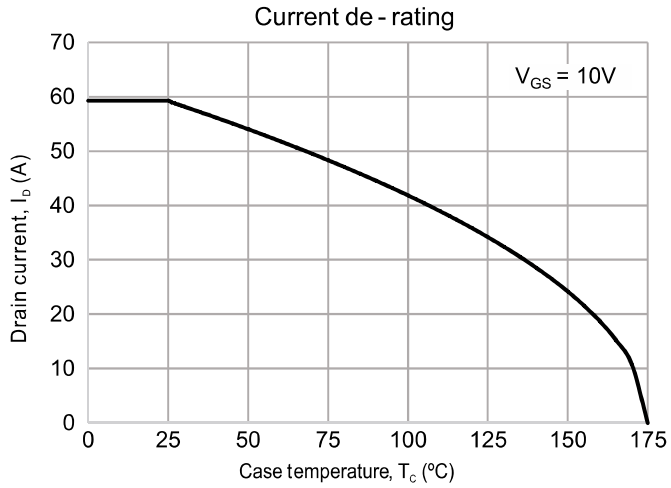


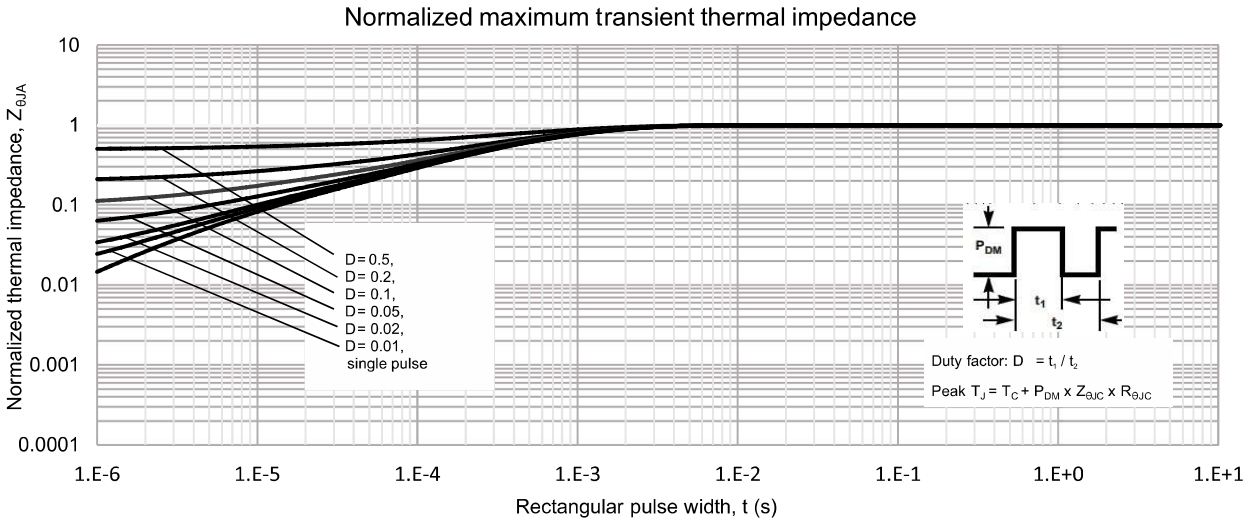
Power de-rating

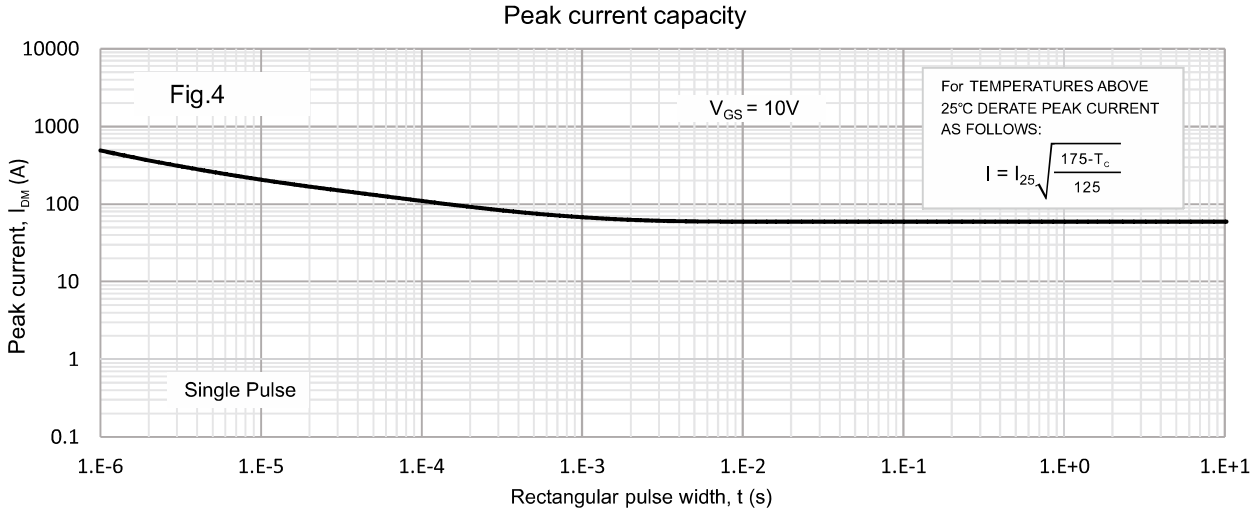


FMOSAT27DN10-Q1-H

Rating and characteristic curves

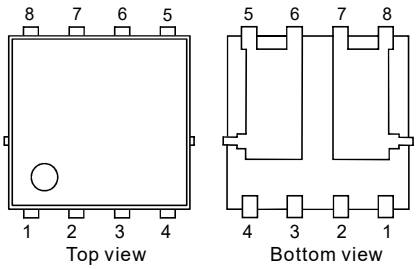
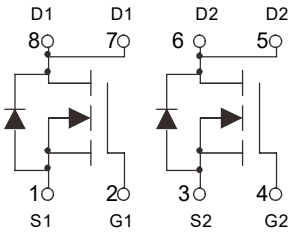






FMOSAT27DN10-Q1-H

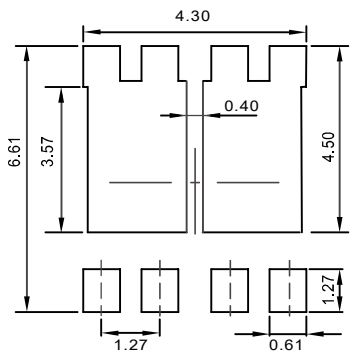
Pinning information

Pin		Simplified outline	Symbol
Pin 1	Source 1		
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
FMOSAT27DN10-Q1-H	L1020PDQ

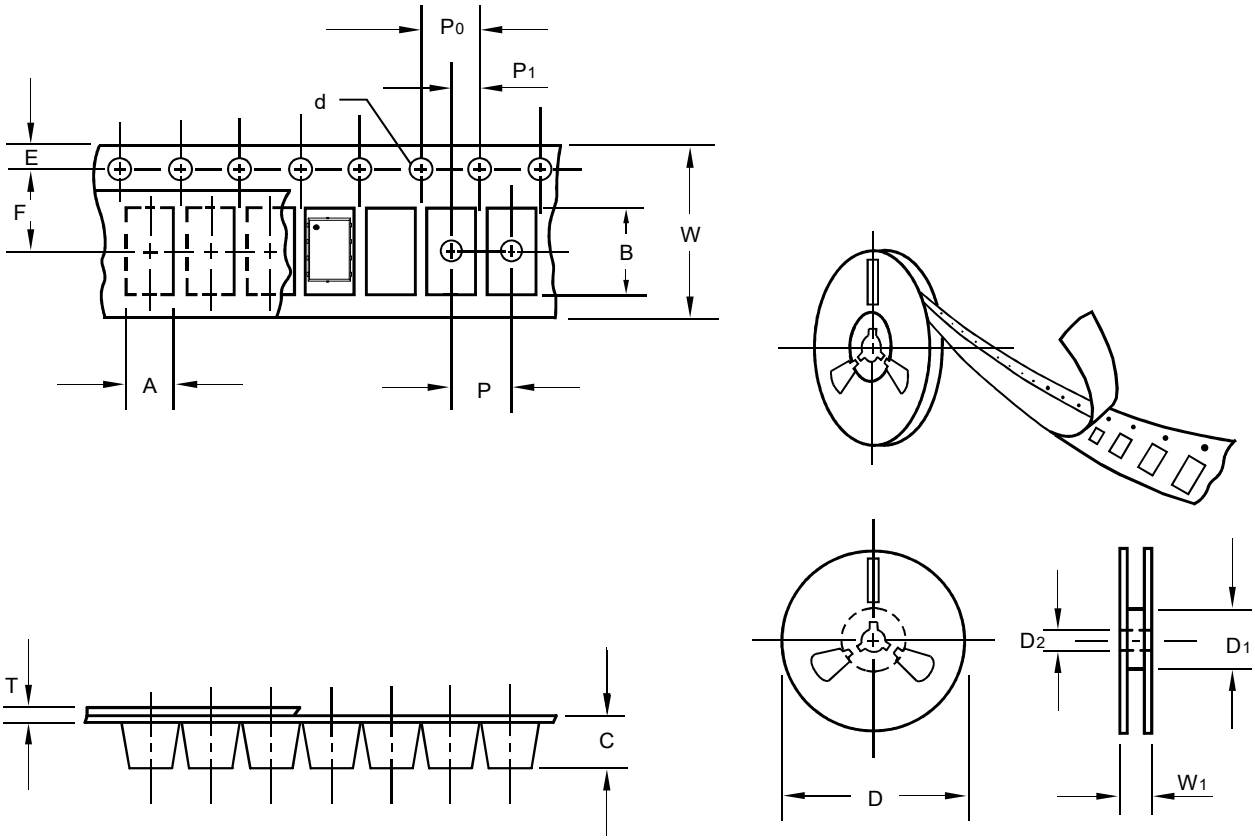
Suggested solder pad layout



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

FMOSAT27DN10-Q1-H

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	D_1	min	100.00
7" Reel outside diameter	D	2.0	-
7" Reel inner diameter	D_1	min	-
Feed hole diameter	D_2	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	P_0	0.1	4.00
Embossment center	P_1	0.1	2.00
Overall tape thickness	T	0.1	0.30
Tape width	W	0.3	12.00
Reel width	W_1	1.0	17.60

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

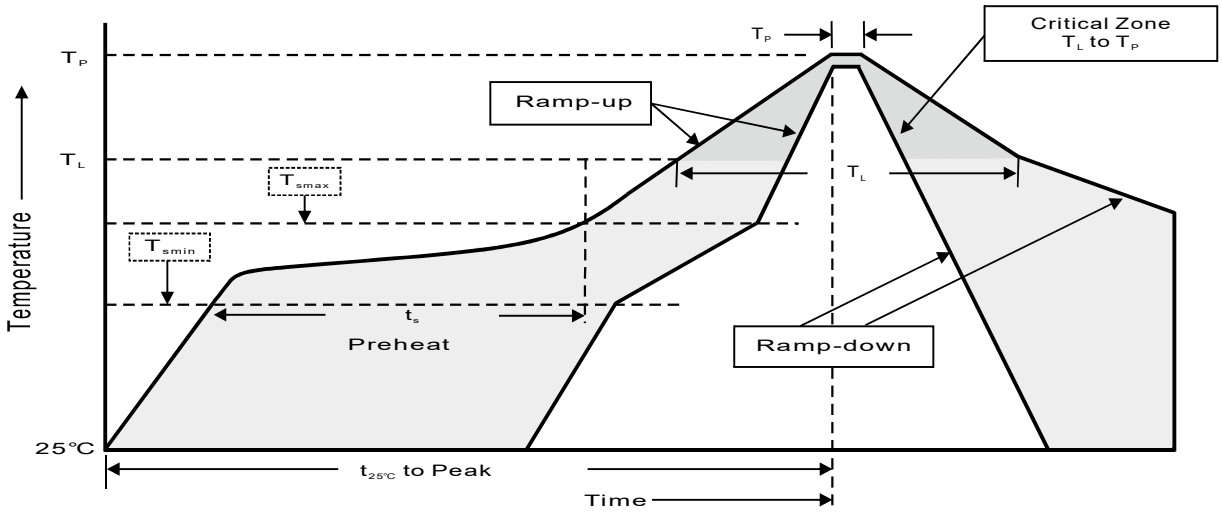
FMOSAT27DN10-Q1-H

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)
T5060P8 Dual	13"	5,000	4.0	10,000	335*335*38	330	350*350*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 ℃/sec
Preheat - Temperature Min (T_{smin}) - Temperature Max (T_{smax}) - Time (Min to Max) (t_s)	 150℃ 200℃ 60 ~ 120 sec
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 with 5℃ of actual peak temperature (T_P)	10 ~30 sec
Ramp-down rate	< 6 ℃/sec
Time 25℃ to peak temperature	< 6 minutes

FMOSAT27DN10-Q1-H

High reliability test capabilities

Item Test	Conditions	Reference
1. MSL Preconditioning	24hr bake@125°C+168hrs@85°C /85%RH+3xIR@260°C+1flux immersion+alcohol+DI H2O rinse	JESD22-A113
2. High Temperature Reverse Bias	V_{DS}=V_{DS}*80% (T_J=T_J max.)Test Duration:1000hrs	JESD22-A108
3. High Temperature Storage Life	Ta=150°C Test Duration:1000hrs	JESD22 A-103
4. Temperature Cycle	-55°C(15min) to 150°C(15min)Test Cycles:1000cycles	JESD22 A-104
5. Autoclave	P=2atm Ta=121°C RH=100% Test Duration:96hrs	JESD22 A-102
6. Solderability	245±5°C for 5sec	J-STD-002
7. Moisture Resistance	Ta=85°C/85% Relative humidity Test Duration:1000hrs	MIL-STD-750E METHOD 1021.2
8. Resistance To Solder Heat	260±5°C for 10sec	JESD22 B-106
9. High Temperature High Humidity Reverse Bias	Ta=85°C, 85%RH, V_{DS}=80% ratedV_{DS} Test Duration: 1000hrs	JESD22-A101