

FMOSAT20DN06

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FMOSAT20DN06

20A 60V Dual N-Channel Enhancement Mode Power MOSFET

Features

- $V_{DS}=60V$, $I_D=20A$.
- $R_{DS(ON)} \leq 25m\Omega$, @ $V_{GS}=10V$, $I_D=10A$.
- $R_{DS(ON)} \leq 35m\Omega$, @ $V_{GS}=4.5V$, $I_D=10A$.
- High density cell design for ultra-low on-resistance.
- Fully characterized avalanche voltage and current.
- Excellent package for good heat dissipation.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates Halogen-free part, ex.FMOSAT20DN06-H.

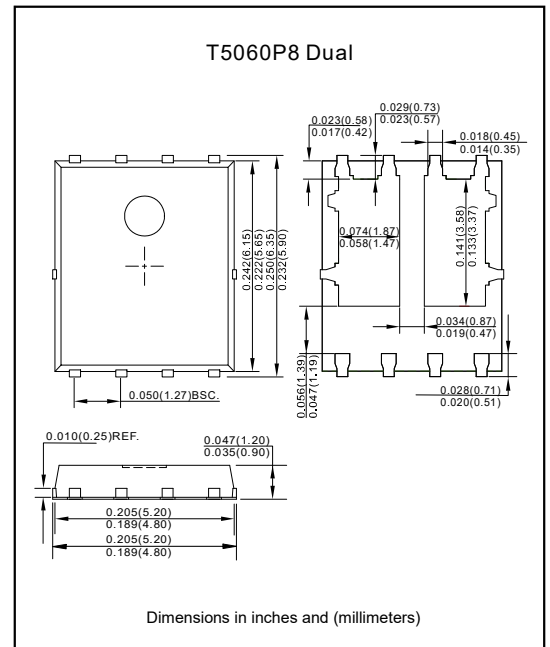
Applications

- DC/DC converter.
- High-frequency switching and synchronous rectification.

Mechanical data

- Epoxy:UL94-V0 rated flame retardant.
- Case : Molded plastic, T5060P8 Dual (DFN5060-8 Dual).
- Mounting Position : Any.

Package outline



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

Parameter	Symbol	Ratings	Unit
Drain-source voltage	V_{DS}	60	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current (Note1)	I_D	20	A
Pulsed drain current (Note2)	I_{DM}	80	A
Single pulse avalanche energy (Note3)	E_{AS}	19	mJ
Power dissipation (Note6)	P_D	87.4	W
Thermal resistance, junction to ambient (Note6)	$R_{\theta JA}$	103.2	$^\circ C/W$
Thermal resistance, junction to case (Note7)	$R_{\theta JC}$	1.43	$^\circ C/W$
Lead temperature for soldering purposes (1/8" form case for 10s)	T_L	260	$^\circ C$
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 $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off characteristics						
Drain-source breakdown voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	60			V
Drain-source leakage current	I _{DSS}	V _{DS} =60V, V _{GS} =0V			1	μA
Gate-source leakage current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V			±100	nA
On characteristics (Note4)						
Gate threshold voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250μA	1	1.7	2.5	V
Static drain-source on-resistance	R _{DS(ON)}	V _{GS} =10V, I _D =10A		17	25	mΩ
		V _{GS} =4.5V, I _D =10A		22	35	
Dynamic parameters (Note5)						
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =30V, f=1MHz		1970	2561	pF
Out capacitance	C _{oss}			97.4	126.6	
Reverse transfer capacitance	C _{rss}			94	122	
Switching parameters (Note5)						
Total gate charge	Q _g	V _{GS} =10V, V _{DS} =48V, I _D =20A		42.8		nC
Gate to source charge	Q _{gs}			4.3		
Gate to drain charge	Q _{gd}			13.6		
Turn-on delay time	t _{d(on)}	V _{DD} =30V, V _{GS} =10V, R _G =11Ω, I _D =20A		5		ns
Rise time	t _r			1.5		
Turn-off delay time	t _{d(off)}			18		
Fall time	t _f			10		
Source-drain diode ratings and characteristics						
Drain-source diode forward voltage (Note4)	V _{SD}	I _S =10A, V _{GS} =0V			1.2	V
Continuous source current (Note 1)	I _S				20	A
Pulsed drain-source diode forward (Note 2)	I _{SM}				80	A

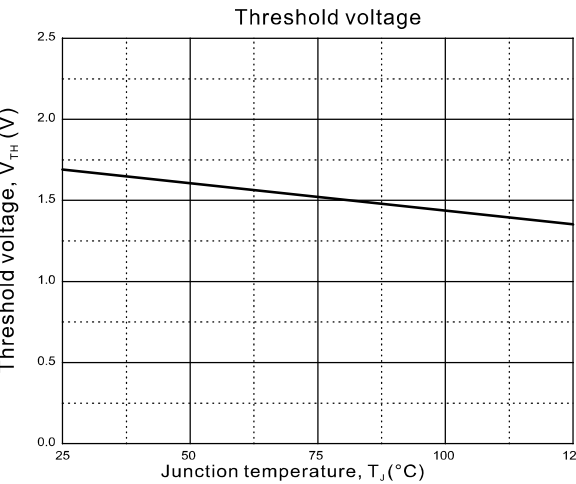
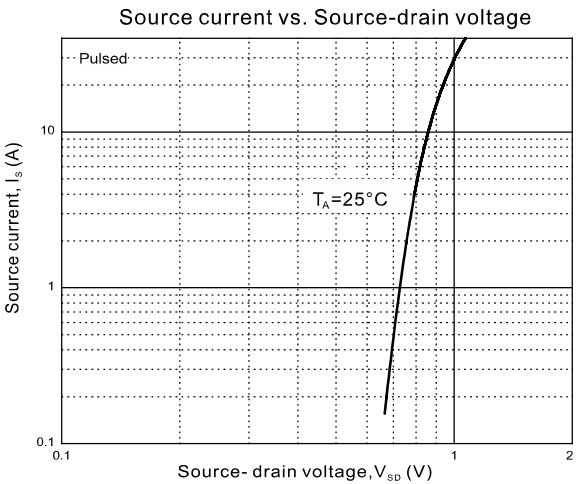
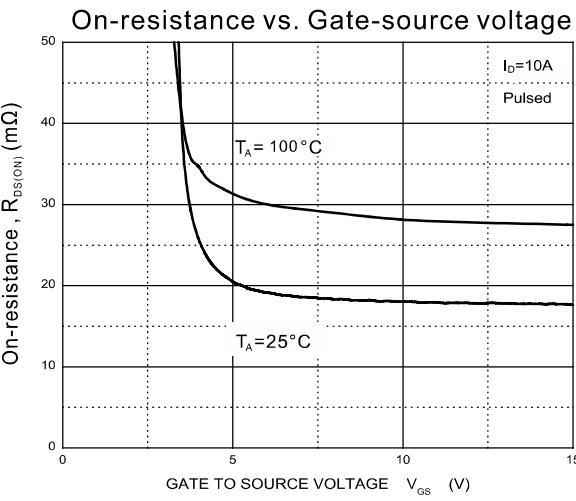
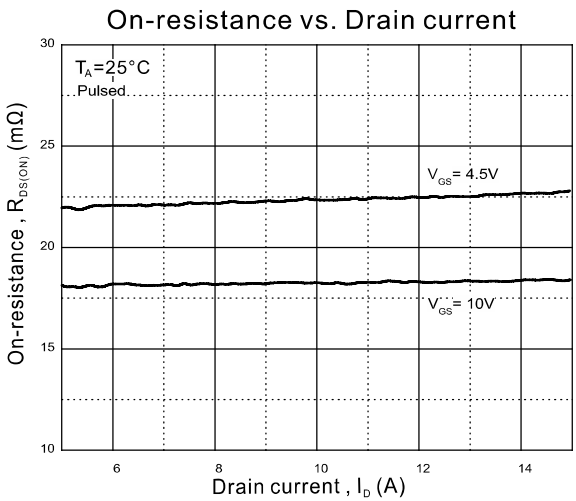
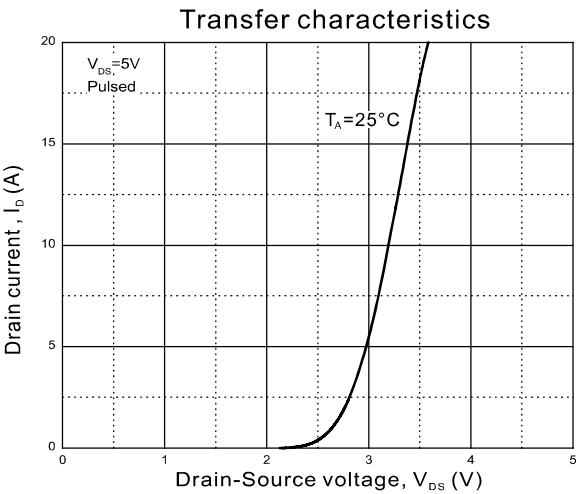
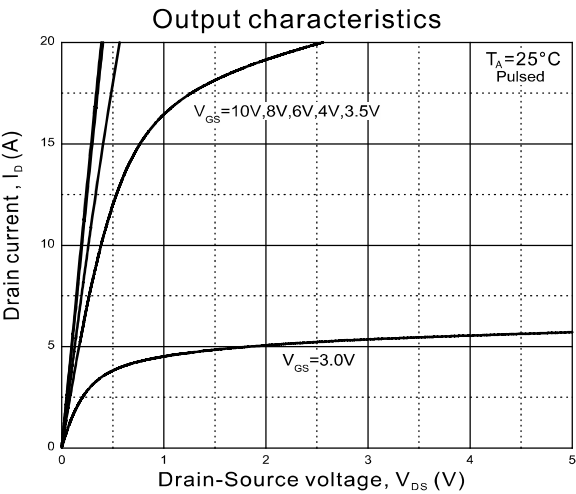
Note : 1. $T_C=25^\circ\text{C}$ limited only by maximum temperature allowed.2. $P_W \leq 10\mu\text{s}$, duty cycle $\leq 1\%$.3. E_{AS} condition: $V_{DD}=30\text{V}$, $V_{GS}=10\text{V}$, $L=0.1\text{mH}$, $R_g=25\Omega$, starting at $T_J=25^\circ\text{C}$.4. Pulse test: pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$

5. Guaranteed by design, not subject to production.

6. The value of $R_{\theta JA}$ is measured with the device on 1 in2 FR-4 board with 2oz. copper, in a still air environment with $T_A=25^\circ\text{C}$. single-side active.7. Single-side active. $T_C=25^\circ\text{C}$.

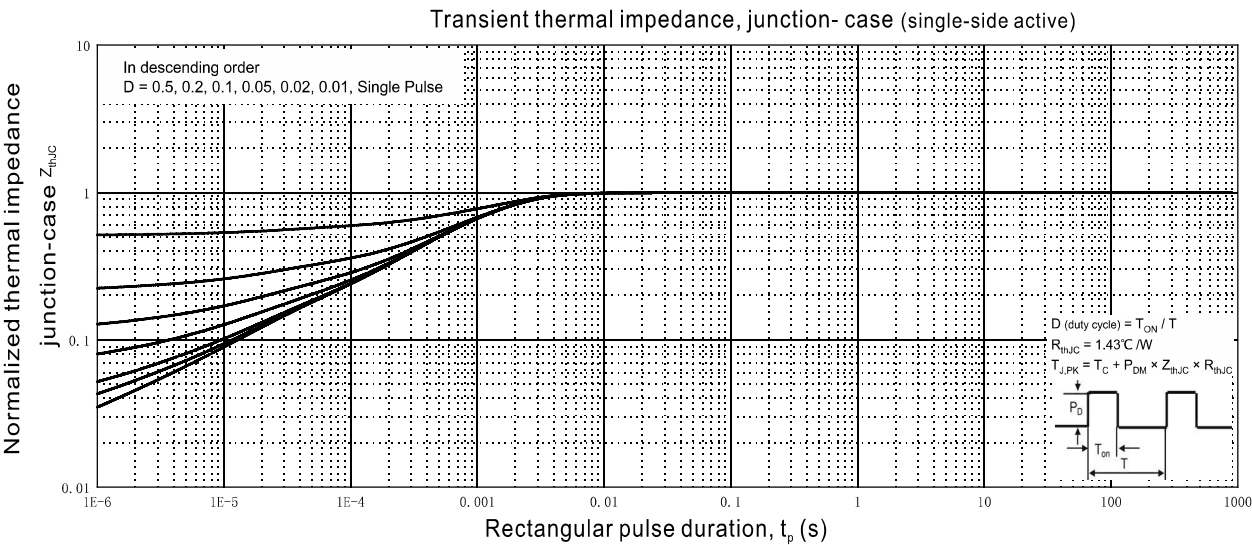
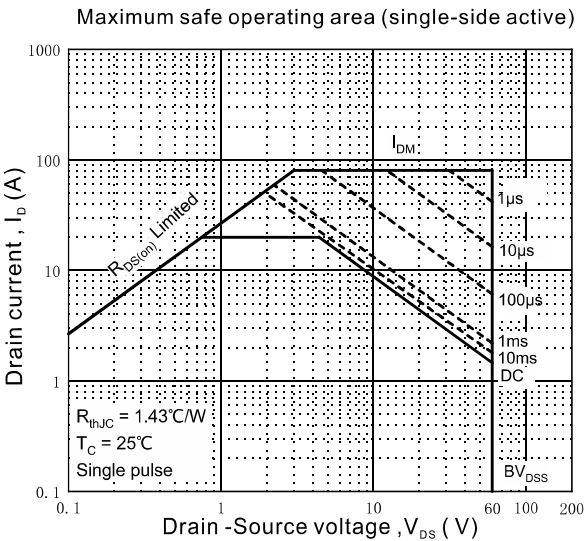
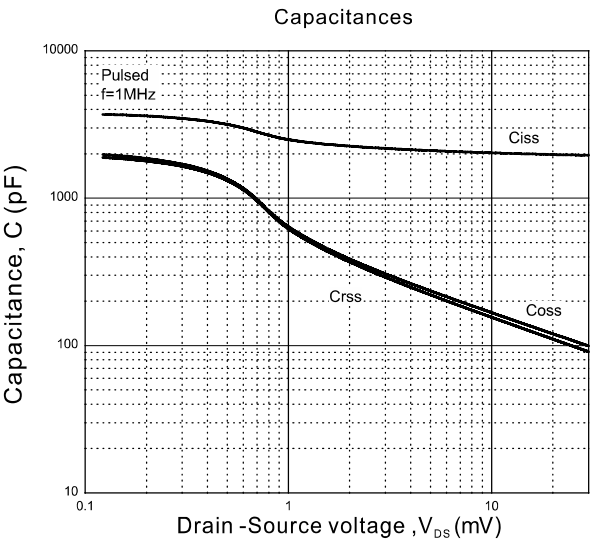
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Rating and characteristic curves



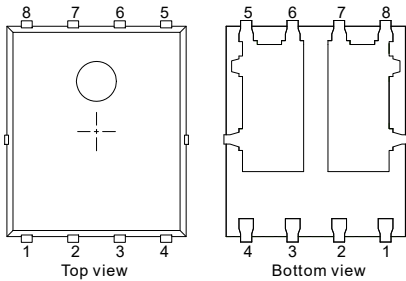
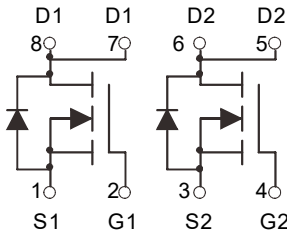
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Rating and characteristic curves



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Pinning information

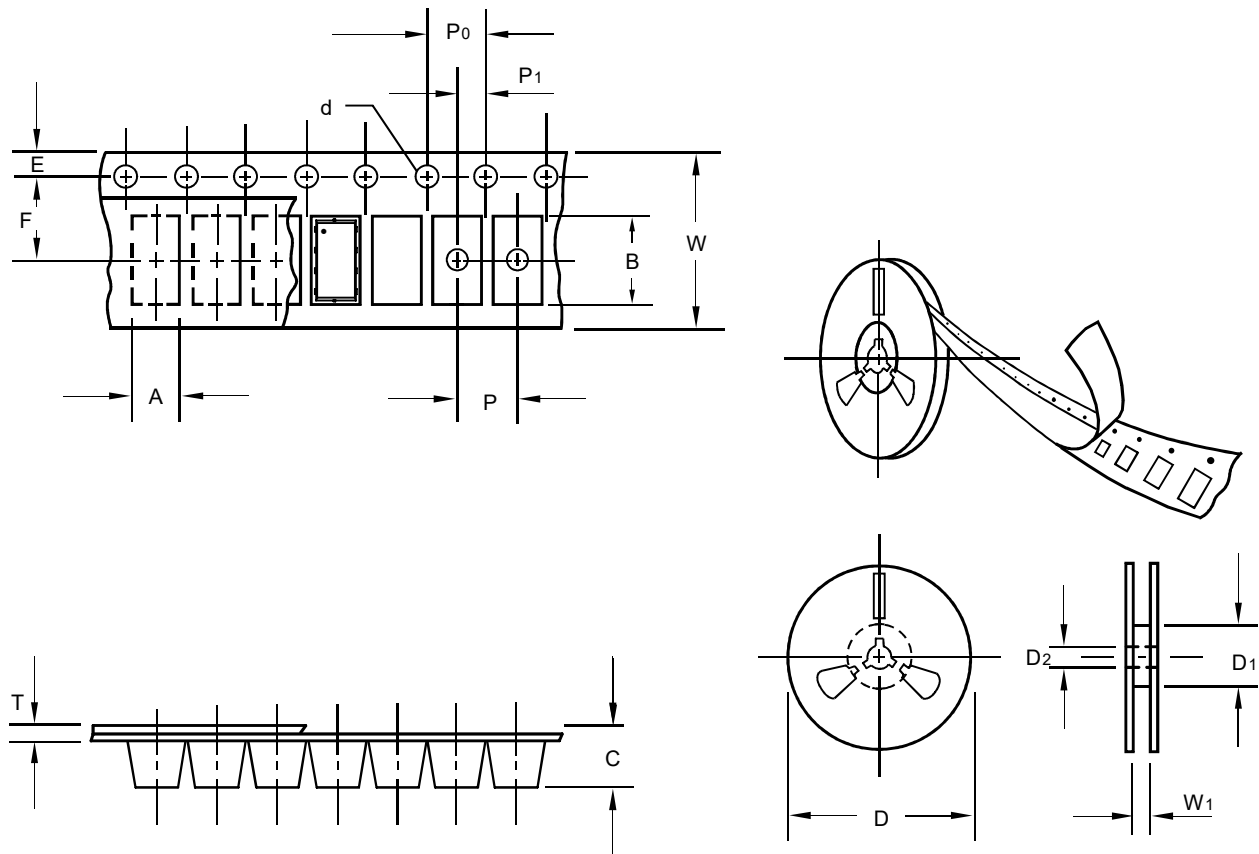
Pin	Simplified outline	Symbol
Pin 1 Source1 Pin 2 Gate1 Pin 3 Source2 Pin 4 Gate2 Pin 5, 6 Drain2 Pin 7, 8 Drain1		

Marking

Type number	Marking code
FMOSAT20DN06	AT20DN06

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Packing information



unit:mm

Item	Symbol	Tolerance	T5060P8 Dual (DFN5060-8 Dual)
Carrier width	A	0.1	6.30
Carrier length	B	0.1	5.30
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	13.50
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
Tape width	W	0.3	12.00
Reel width	W1	1.0	12.40

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

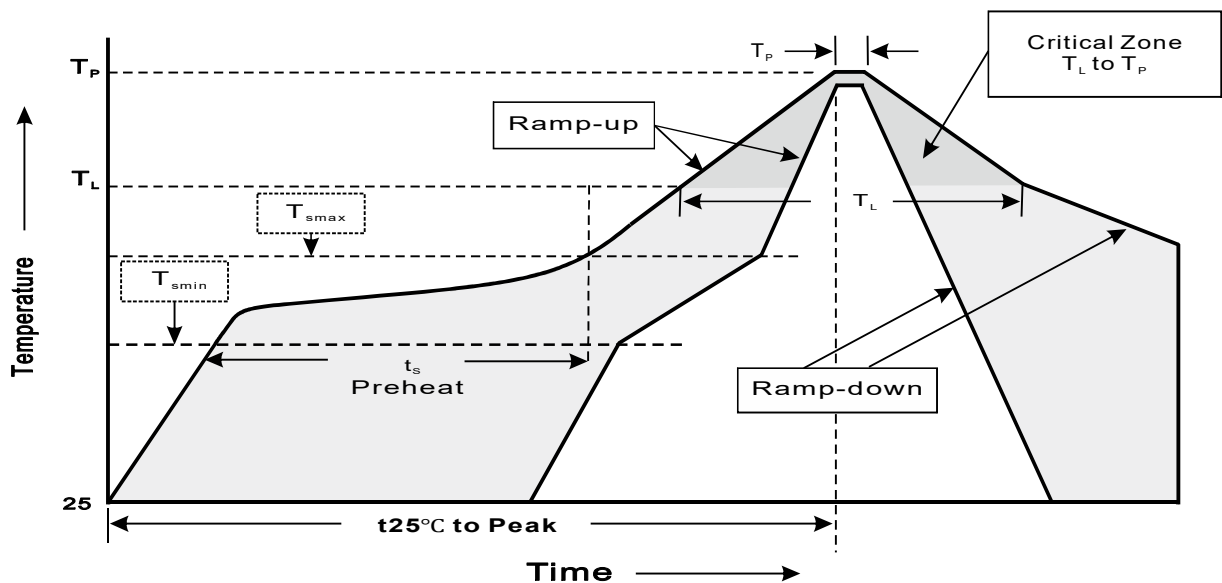
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Reel packing

Device	Outline	Device Package	Reel Size	Reel (pcs)
FMOSAT20DN06	Taping	T5060P8 Dual	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)	$< 3^\circ\text{C/sec}$
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	$< 3^\circ\text{C/sec}$
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	$< 6^\circ\text{C/sec}$
Time 25°C to peak temperature	$< 6 \text{ minutes}$