

FMOSGTACS289N06-Q1-H

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FMOSGTACS289N06-Q1-H

289A 60V N-Channel Shield Gate Trench
Enhancement Mode Power MOSFET

Features

- $V_{DS}=60V$, $I_D=289A$.
- $R_{DS(ON)} \leq 1.1m\Omega$, @ $V_{GS}=10V$, $I_D=20A$.
- Wettable flank for improved optical inspection.
- 100% UIS and R_g tested.
- Qualified to AEC-Q101 standards for high reliability.
- Lead-free parts meet RoHS requirements.
- Halogen-free (IEC61249-2-21).

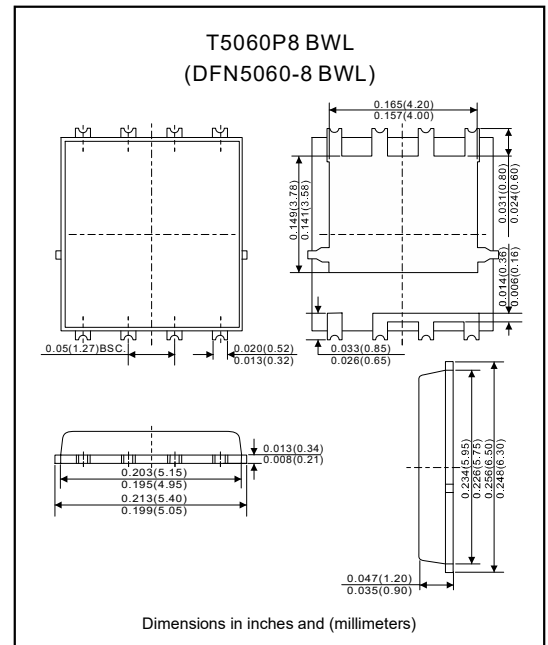
Applications

- General automotive applications.

Mechanical data

- Epoxy:UL94-V0 rated flame retardant.
- Case : Molded plastic,T5060P8 BWL (DFN5060-8 BWL).
- Weight : Approximated 115mg.

Package outline

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

Parameter	Symbol	Ratings	Unit
Drain-source voltage	V_{DS}	60	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current ($V_{GS}=10V$) (Note1)	I_D	289	A
($T_c=100^\circ C$)		205	
Pulsed drain current (Note2)	I_{DM}	1158	A
Single pulse avalanche current ($L=0.3mH$)	I_{AS}	62	A
Single pulse avalanche energy (Note3)	E_{AS}	1040	mJ
Power dissipation	P_D	169	W
($T_c=100^\circ C$)		84	
Thermal resistance, junction to ambient (Note4)	$R_{\theta JA}$	38	$^\circ C/W$
Thermal resistance, junction to case (Note5)	$R_{\theta JC}$	0.89	$^\circ C/W$
Operating Junction temperature	T_J	+175	$^\circ C$
Storage temperature range	T_{STG}	-55 to +175	$^\circ C$

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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 (Note6)						
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
		V _{DS} =60V, V _{GS} =0V, T _J =125°C			100	
Gate-source leakage current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V			±100	nA
On characteristics (Note6)						
Gate threshold voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250μA	2	3	4	V
Static drain-source on-resistance	R _{DS(ON)}	V _{GS} =10V, I _D =20A		0.86	1.1	mΩ
Forward transconductance	g _{FS}	V _{DS} =5V, I _D =20A		76		S
Dynamic parameters (Note7)						
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =30V, f=1.0MHz		7441	9673	pF
Out capacitance	C _{oss}			3401	4421	
Reverse transfer capacitance	C _{rss}			174	348	
Gate resistance	R _g	V _{GS} =0V, V _{DS} =0V, f=1.0MHz		2.3		Ω
Switching parameters (Note7)						
Total gate charge	Q _g	V _{GS} =6V, V _{DS} =30V, I _D =20A		95	124	nC
		V _{GS} =10V, V _{DS} =30V, I _D =20A		121	157	
Gate to source charge	Q _{gs}	V _{GS} =10V, V _{DS} =30V, I _D =20A		31	47	
Gate to drain charge	Q _{gd}			30	45	
Gate plateau voltage	V _{plateau}			4.8		V
Turn-on delay time	t _{d(on)}	V _{DS} =30V, V _{GS} =10V, R _{GEN} =3Ω, I _D =20A		11		ns
Rise time	t _r			28		
Turn-off delay time	t _{d(off)}			95		
Fall time	t _f			42		
Source-drain diode ratings and characteristics (Note7)						
Drain-source diode forward voltage	V _{SD}	I _S =2.0A, V _{GS} =0V		0.7	1.2	V
Continuous source current	I _S	T _C =25°C			289	A
Reverse recovery time	t _{rr}	I _F =20V, dI/dt=100A/μs, T _J =25°C		89		ns
Reverse recovery charge	Q _{rr}			190		nC

Note: 1. This current is chip limited, which is calculated based on $R_{\theta JC}$.2. This current is calculated on single pulse with 10 μs pulse & duty cycle= 1%.3. Defined by design, not subject to production test, E_{AS} condition: $T_J=25^{\circ}\text{C}$, $V_{DS}=30\text{V}$, $V_{GS}=10\text{V}$, $L=1.0\text{mH}$.

4. Device mounted on FR-4 substrate PC board with 2oz copper in 1inch square cooling area.

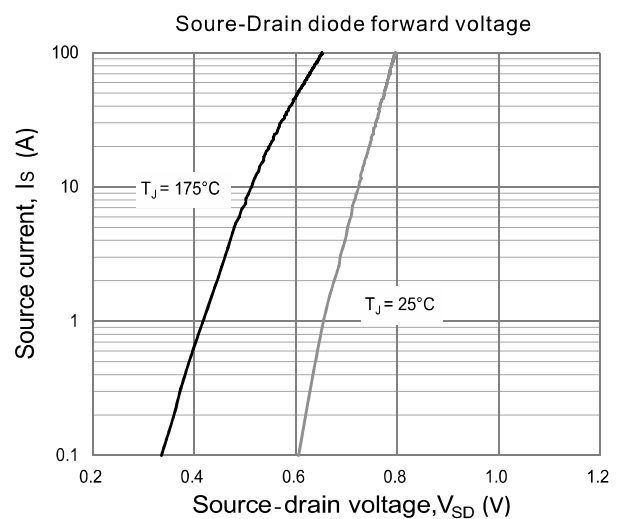
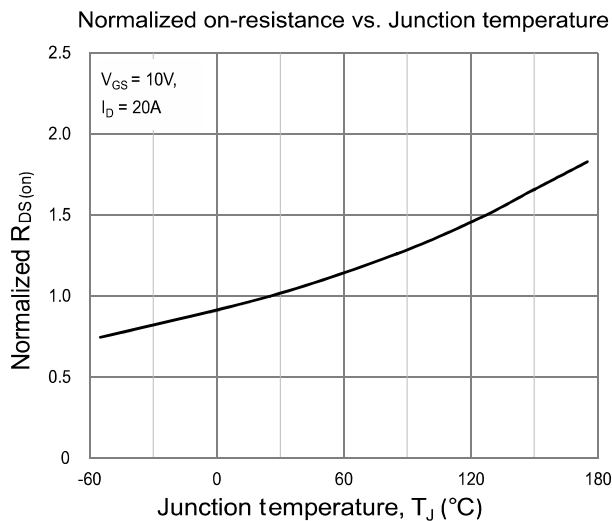
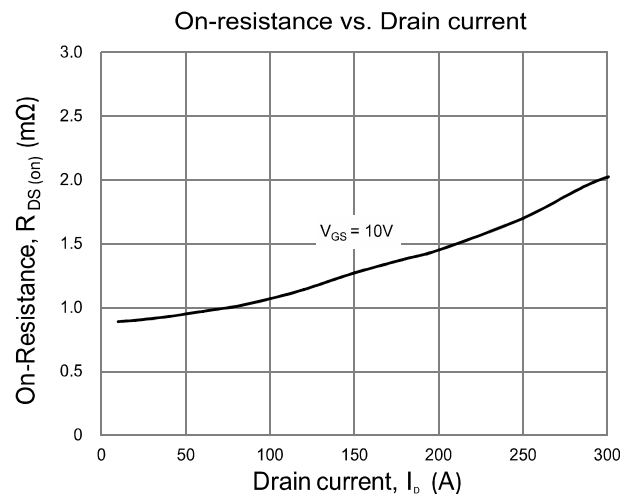
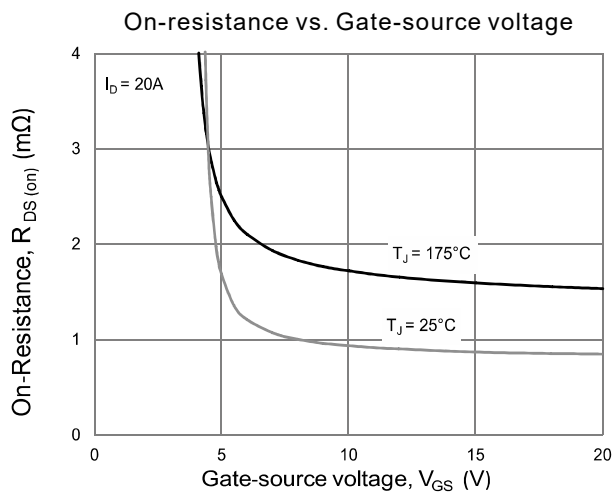
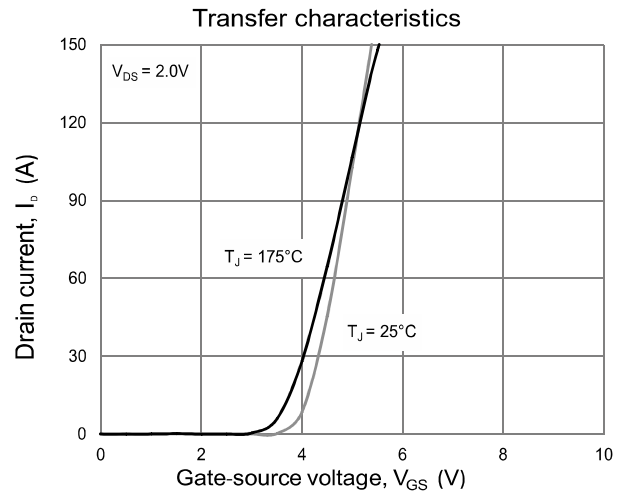
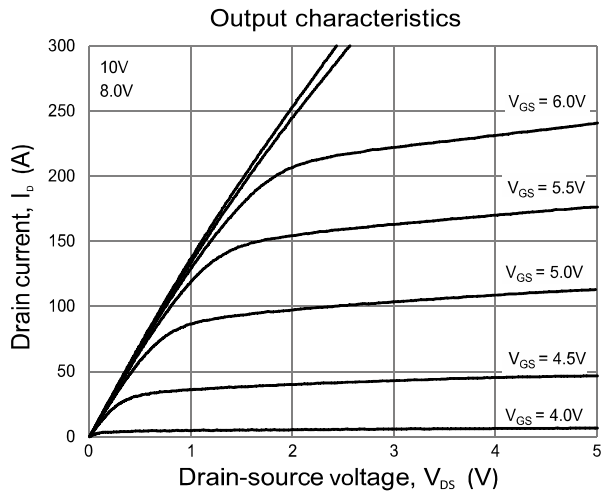
5. Thermal resistance from junction to soldering point (on the exposed drain pad).

6. Short duration pulse test used to minimize self-heating effect.

7. Defined by design, not subject to production.

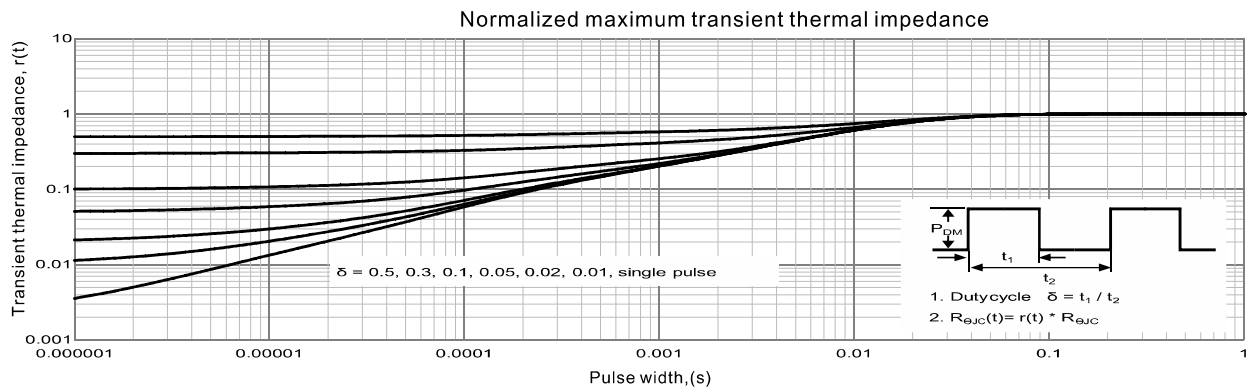
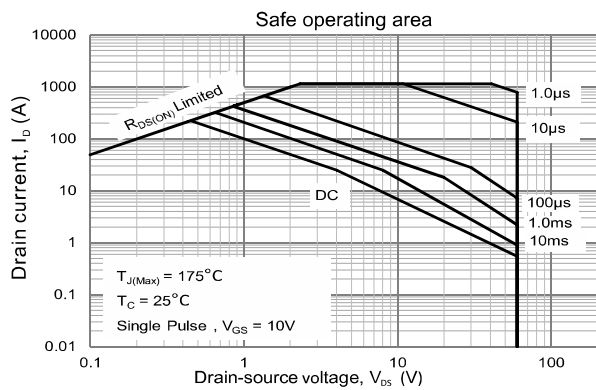
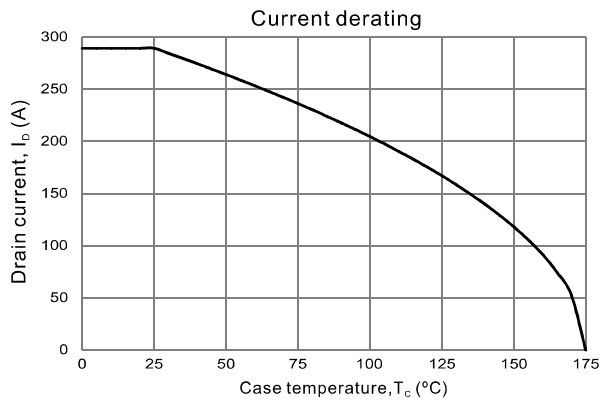
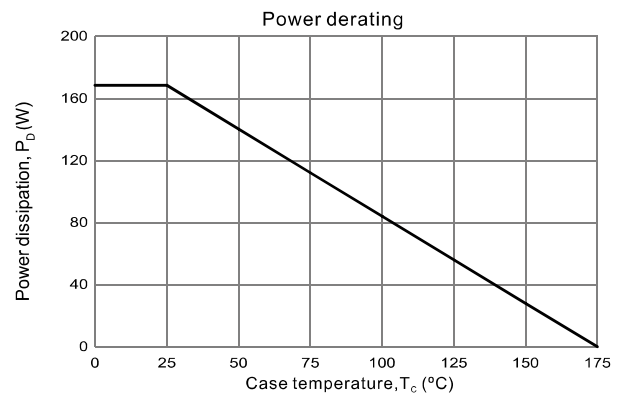
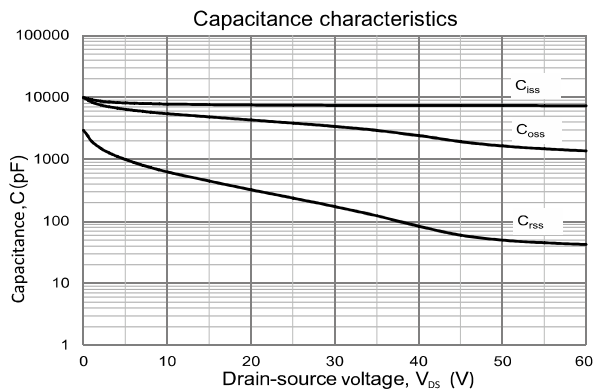
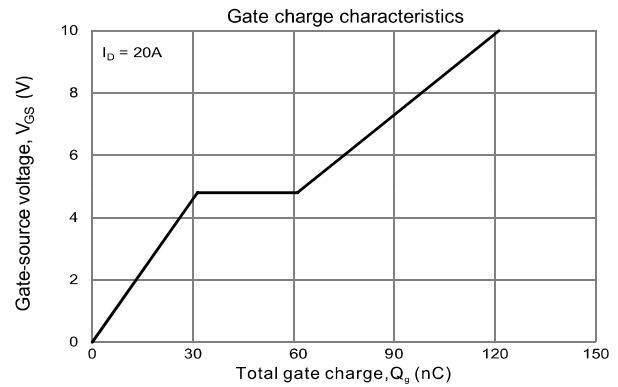
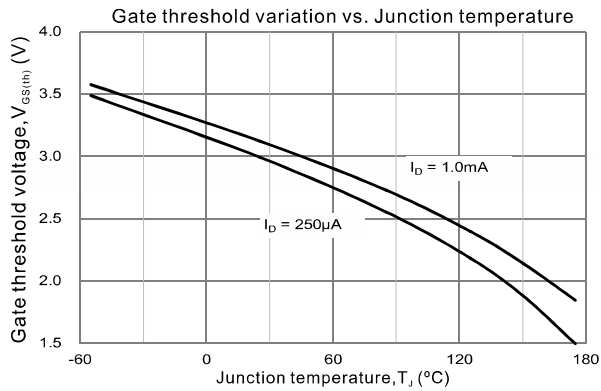
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Rating and characteristic curves



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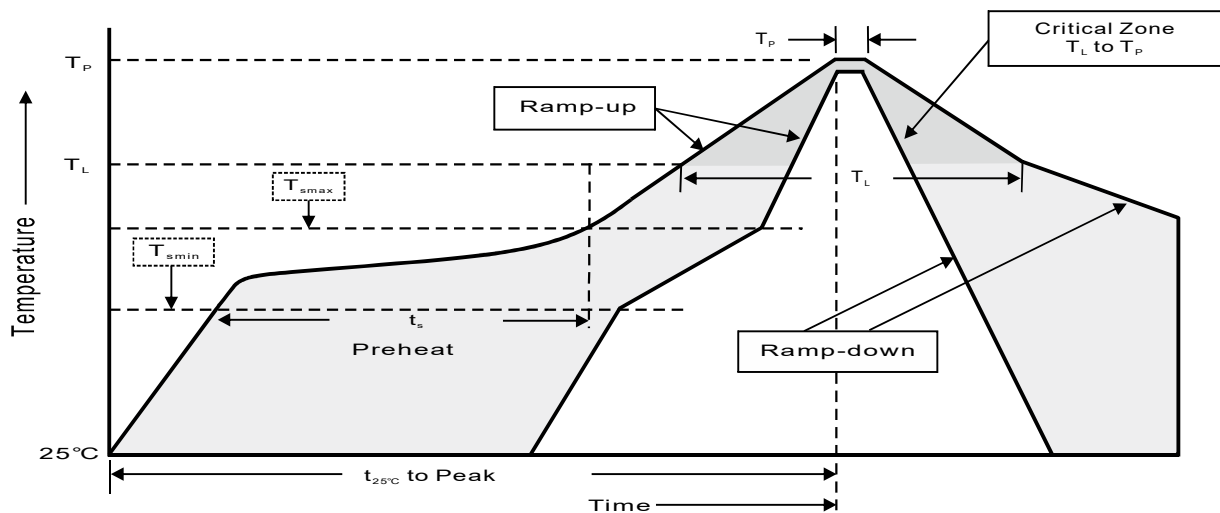
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Reel packing

Device	Outline	Device Package	Reel Size	Reel (pcs)
FMOSGTACS289N06-Q1-H	Taping	T5060P8 BWL	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 °C/sec
Preheat - Temperature Min (T_{smin}) - Temperature Max (T_{smax}) - Time (Min to Max) (t_s)	150°C 200°C 60 ~ 120 sec
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 with 5°C of actual peak temperature (T_p)	10 ~30 sec
Ramp-down rate	< 6 °C/sec
Time 25°C to peak temperature	< 6 minutes