

### Description

LMFZ180N04 use advanced SGT MOSFET technology to provide low  $R_{DS(on)}$ , low gate charge, fast switching and excellent avalanche characteristics. This device is specially designed to get better ruggedness and suitable to use in Synchronous-rectification applications.

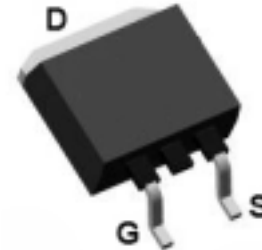
### General Features

- Low  $R_{DS(on)}$  & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Fast switching and soft recovery
- Invertors
- Synchronous-rectification applications

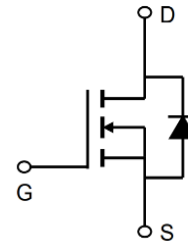
### Application

- Consumer electronic power supply
- Motor control
- Synchronous-rectification
- Isolated DC
- Synchronous-rectification applications

### Dimensions TO-263



### Pin Configuration



### Package Marking and Ordering Information

Device	Device Marking	Device Package	Reel Size	Tape width	Quantity
LMFZ180N04	APG180N04T	TO-263	-	-	800 units

### Absolute Maximum Ratings (TC=25 °C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain source voltage	V <sub>DS</sub>	40	V
Gate source voltage	V <sub>GS</sub>	±20	V
Continuous drain current <sup>1)</sup>	I <sub>D</sub>	180	A
Pulsed drain current <sup>2)</sup>	I <sub>D, pulse</sub>	390	A
Power dissipation <sup>3)</sup>	P <sub>D</sub>	140	W
Single pulsed avalanche energy <sup>4)</sup>	E <sub>AS</sub>	300	mJ
Operation and storage temperature	T <sub>stg</sub> , T <sub>j</sub>	-55 to 150	°C
Thermal resistance, junction-case	R <sub>θJC</sub>	0.89	°C/W
Thermal resistance, junction-ambient <sup>5)</sup>	R <sub>θJA</sub>	62	°C/W

## Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	BV <sub>DSS</sub>	40			V	V <sub>GS</sub> =0 V, I <sub>D</sub> =250 μA
Gate threshold voltage	V <sub>GS(th)</sub>	1.3		2.5	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250 μA
Drain-source on-state resistance	R <sub>DS(ON)</sub>		1.5	2.0	mΩ	V <sub>GS</sub> =10 V, I <sub>D</sub> =55 A
Drain-source on-state resistance	R <sub>DS(ON)</sub>		2.5	3.0	mΩ	V <sub>GS</sub> =4.5 V, I <sub>D</sub> =55 A
Gate-source leakage current	I <sub>GSS</sub>			100	nA	V <sub>GS</sub> =20 V
				-100		V <sub>GS</sub> =-20 V
Drain-source leakage current	I <sub>DSS</sub>			1	μA	V <sub>DS</sub> =40 V, V <sub>GS</sub> =0 V
Input capacitance	C <sub>iss</sub>		6587.4		pF	V <sub>GS</sub> =0 V, V <sub>DS</sub> =20 V, f=100 kHz
Output capacitance	C <sub>oss</sub>		2537.3		pF	
Reverse transfer capacitance	C <sub>rss</sub>		178.8		pF	
Turn-on delay time	t <sub>d(on)</sub>		26.6		ns	V <sub>GS</sub> =10 V, V <sub>DS</sub> =20 V, R <sub>G</sub> =2 Ω, I <sub>D</sub> =20 A
Rise time	t <sub>r</sub>		9.3		ns	
Turn-off delay time	t <sub>d(off)</sub>		96		ns	
Fall time	t <sub>f</sub>		39.3		ns	
Total gate charge	Q <sub>g</sub>		96.8		nC	I <sub>D</sub> =20 A, V <sub>DS</sub> =20 V, V <sub>GS</sub> =10 V
Gate-source charge	Q <sub>gs</sub>		14.5		nC	
Gate-drain charge	Q <sub>gd</sub>		18.4		nC	
Gate plateau voltage	V <sub>plateau</sub>		2.7		V	
Diode forward current	I <sub>S</sub>			130	A	V <sub>GS</sub> <V <sub>th</sub>
Pulsed source current	I <sub>SP</sub>			390		
Diode forward voltage	V <sub>SD</sub>			1.3	V	I <sub>S</sub> =20 A, V <sub>GS</sub> =0 V
Reverse recovery time	t <sub>rr</sub>		205		ns	I <sub>S</sub> =20 A, di/dt=100 A/μs
Reverse recovery charge	Q <sub>rr</sub>		557.4		nC	
Peak reverse recovery current	I <sub>rrm</sub>		4.3		A	

### Note

- 1) Calculated continuous current based on maximum allowable junction temperature.
- 2) Repetitive rating; pulse width limited by max. junction temperature.
- 3) Pd is based on max. junction temperature, using junction-case thermal resistance.
- 4) V<sub>DD</sub>=30 V, R<sub>G</sub>=50 Ω, L=0.3 mH, starting T<sub>J</sub>=25 °C.
- 5) The value of R<sub>θJA</sub> is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>a</sub>=25 °C.

## Thermal Characteristics

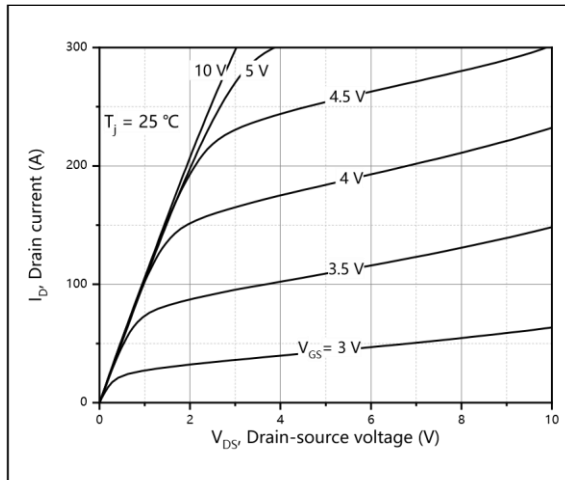


Figure 1, Typ. output characteristics

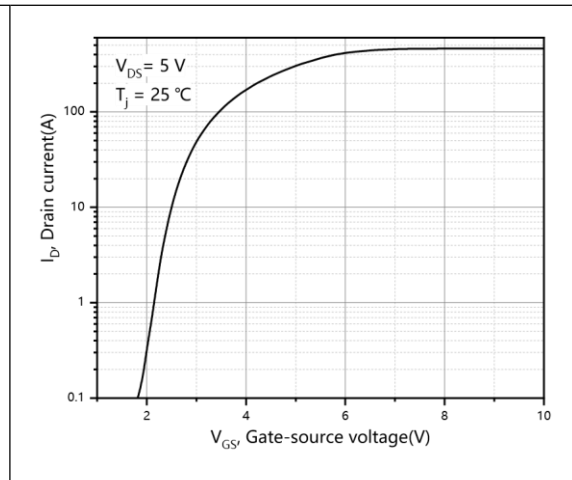


Figure 2, Typ. transfer characteristics

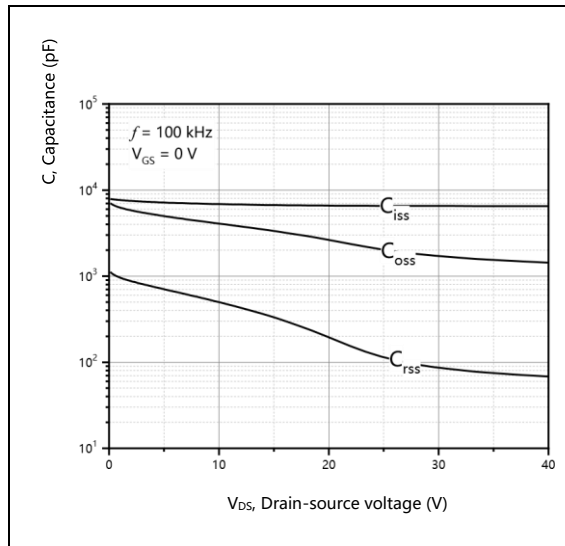


Figure 3, Typ. capacitances

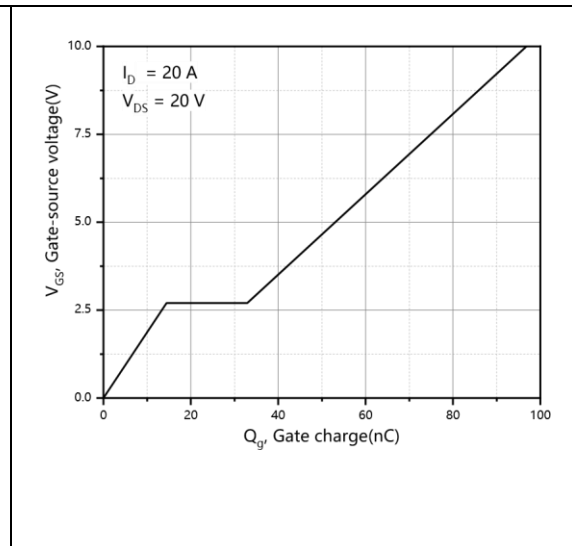


Figure 4, Typ. gate charge

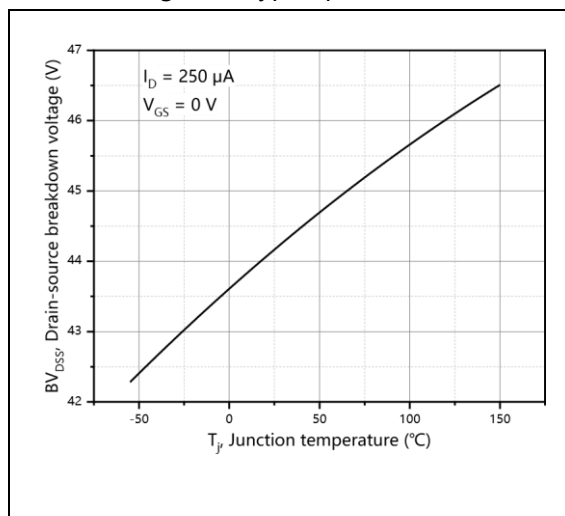


Figure 5, Drain-source breakdown voltage

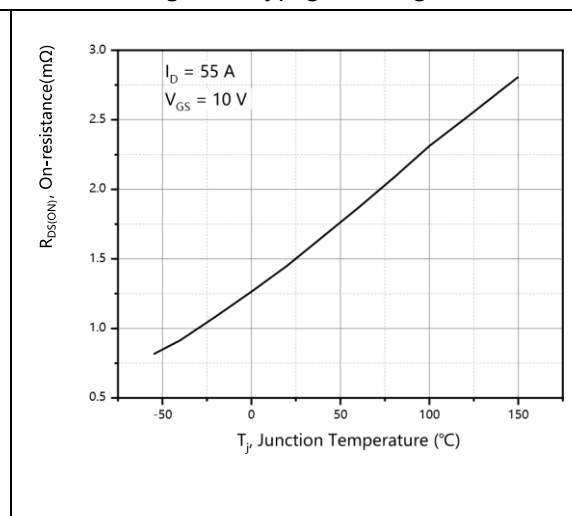


Figure 6, Drain-source on-state resistance

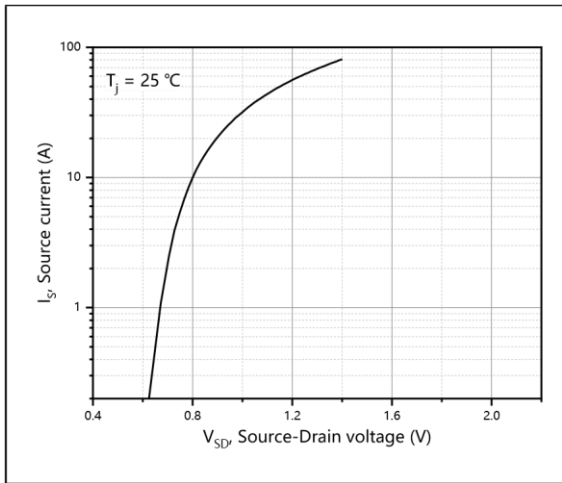


Figure 7, Forward characteristic of body diode

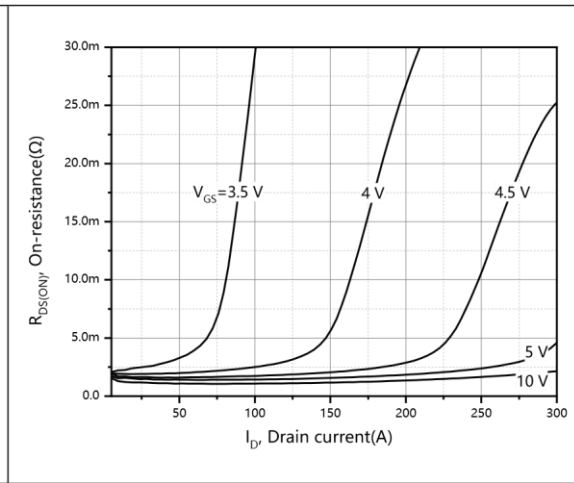


Figure 8, Drain-source on-state resistance

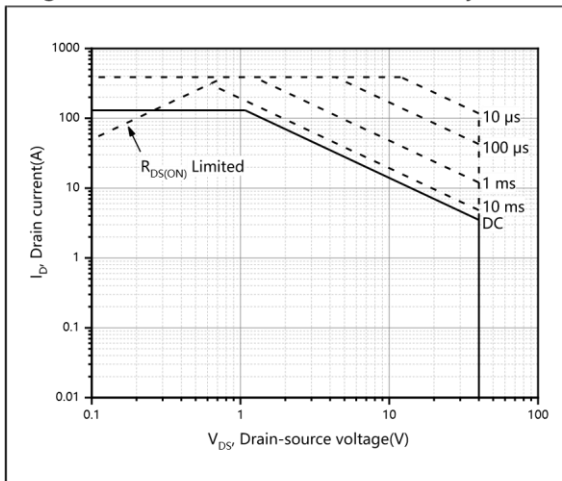


Figure 9, Safe operation area  $T_C=25\text{ °C}$

Test circuits and waveforms

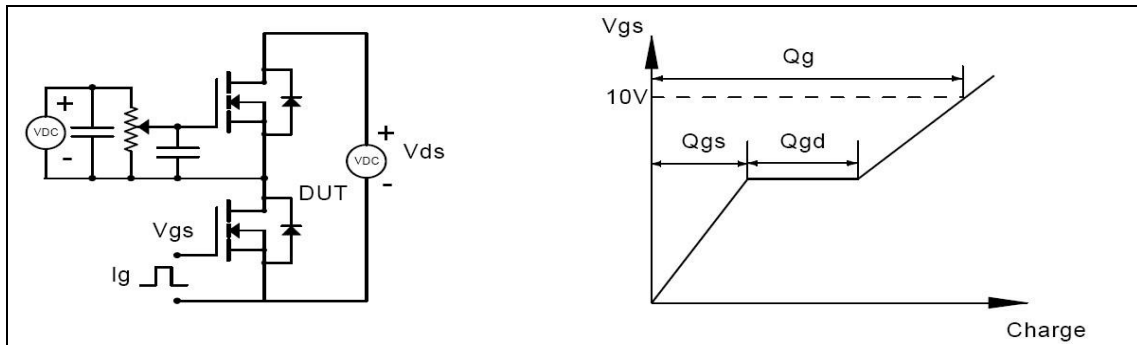


Figure 1, Gate charge test circuit & waveform

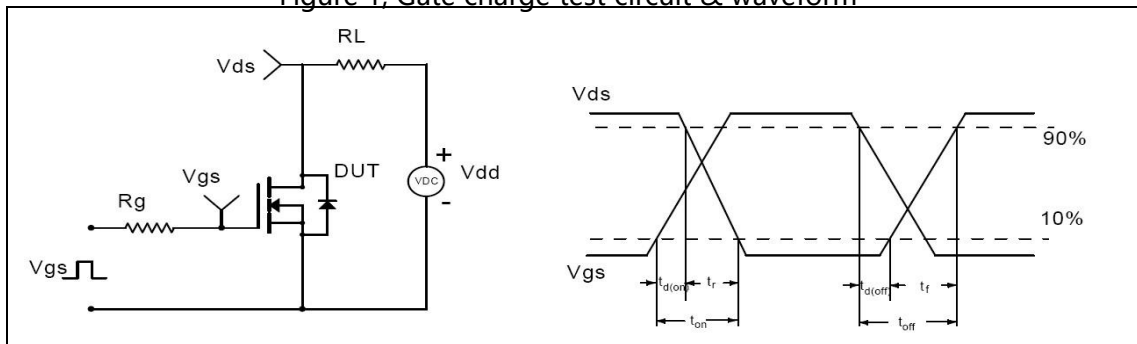


Figure 2, Switching time test circuit & waveforms

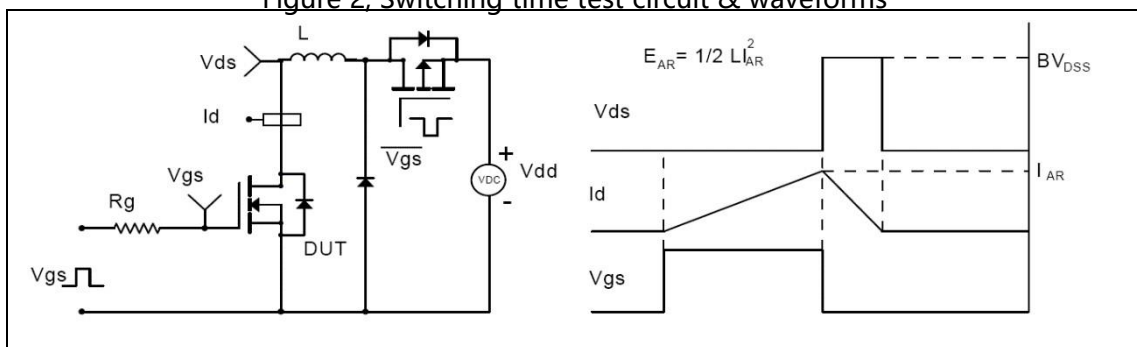


Figure 3, Unclamped inductive switching (UIS) test circuit & waveforms

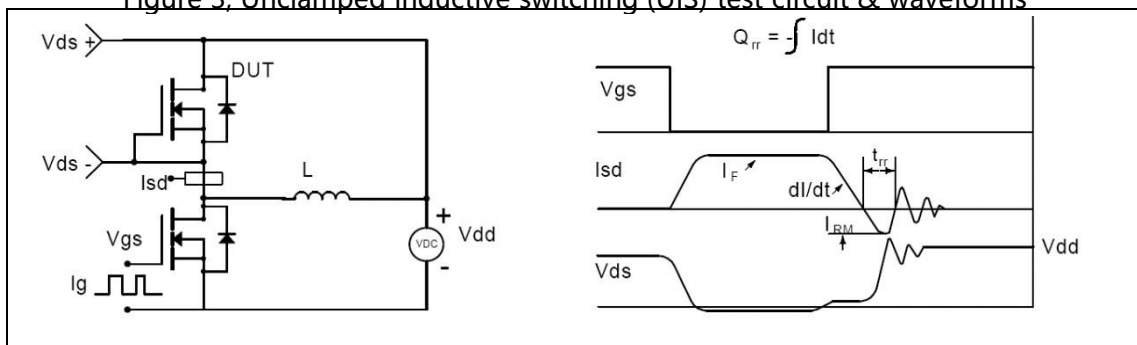


Figure 4, Diode reverse recovery test circuit & waveforms

