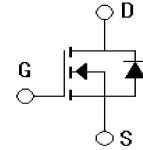
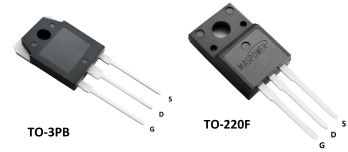


Features

- Low On-Resistance
- Fast switching
- High Input Resistance
- RoHS Compliant

Applications

- Electronic ballasts
- Electronic Transformer
- Switch Mode Power Supply



Absolute Ratings (Tc=25°C)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V _{DSS}	500	V
Drain Current -continuous	I _D , T=25°C T=100°C	20*	A
		15	A
Drain Current - pulse (note 1)	I _{DM}	80	A
Gate-Source Voltage	V _{GSS}	±30	V
Single Pulsed Avalanche Energy (note 2)	E _{AS}	1000	mJ
Power Dissipation (TO-3PB\TO-247\TO-220)	PD TC=25°C	290	W
		2.17	W/°C
Power Dissipation(TO-220F)	PD TC=25°C	31.7	W
		0.25	W/°C
Storage Temperature	T _{STG}	-55~+150	°C
Junction Temperature	T _j	150	°C

*Drain current limited by maximum junction temperature

Electrical Characteristics(T_{CASE}=25°C unless otherwise specified)

Parameter	Symbol	Tests conditions	Min	Type	Max	Units
Off-Characteristics						
Drain-Source Voltage	BV _{DSS}	I _D =250uA, V _{GS} =0V	500	-	-	V
Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} /ΔT _J	I _D =250μA, referenced to 25°C	-	0.6	-	V/°C

Drain cut-off current	I _{DSS}	V _{DS} =500V, V _{GS} =0V	-	-	1	μA
		V _{DS} =400V, T _j =125℃	-	-	10	
Gate-body leakage current, forward	I _{GSSF}	V _{DS} =0V, V _{GS} =30V	-	-	100	nA
Gate-body leakage current, reverse	I _{GSSR}	V _{DS} =0V, V _{GS} =-30V	-	-	-100	nA
On-Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250uA	2.0	-	4.0	V
Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =12A (note 3)	-	0.2	0.25	Ω
Forward Transconductance	g _{fs}	V _{DS} =40V , I _D =9.5A (note 3)	-	19.7	-	S
Dynamic Characteristics						
Input capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1.0MHZ	-	2850	3900	pF
Output capacitance	C _{oss}		-	260	355	
Reverse transfer capacitance	C _{rss}		-	7	23	
Switching Characteristics						
Turn-On delay time	td(on)	V _{DD} =250V, I _D =20A, R _G =25Ω, V _{GS} =10V(note 4,5)	-	30	92	ns
Turn-On rise time	tr			43	170	ns
Turn-Off delay time	td(off)			110	265	ns
Turn-Off Fall time	tf			50	122	ns
Total Gate Charge	Qg	V _{DS} =400V, I _D =20A, V _{GS} =10V(note4,5)	-	48.7	59.3	nC
Gate-Source charge	Qgs		-	9.5	-	nC
Gate-Drain charge	Qgd		-	20.6	-	nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =20A (note 3)	-	-	1.4	V
Maximum Continuous Drain-Source Diode Forward Current	I _s		-	-	20	A
Reverse recovery time	trr	V _{GS} =0V, I _F =20A dI _F /dt=100A/us(note 3)	-	400	-	ns
Reverse recovery charge	Qrr		-	4.2	-	uC

Thermal Characteristic

Parameter	Symbol	Value		Unit
		MS20N50FB \FC\FT	MS20N50FS	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.43	3.94	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	40	80	°C/W

Order Message

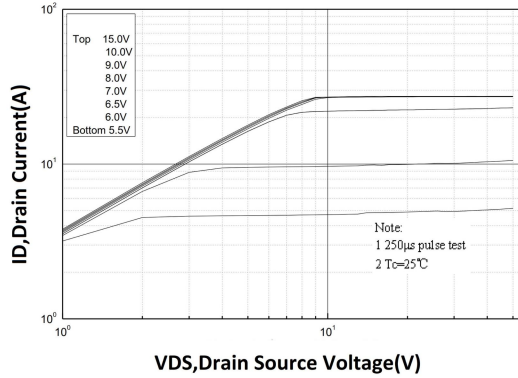
Order codes	Package	Packaging
MS20N50FB	TO-3PB	Tube
MS20N50FC	TO-247	Tube
MS20N50FS	TO-220F	Tube
MS20N50FT	TO-220	Tube

Notes:

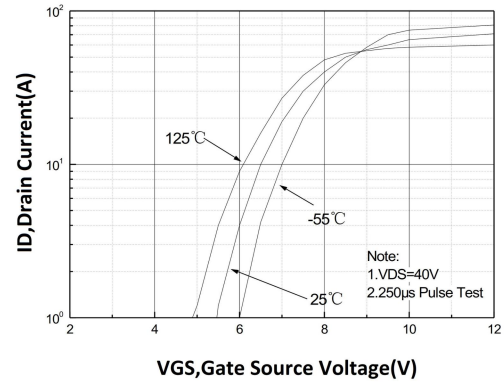
1. Repetitive rating: Pulse width limited by maximum junction temperature
2. Starting $T_j=25^{\circ}\text{C}$, $V_{DD}=50\text{V}$, $L=5\text{mH}$, $R=25\Omega$, $I_{AS}=24.0\text{A}$
3. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$

Electrical Characteristics

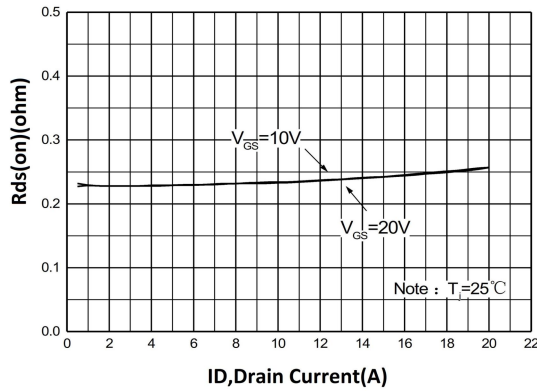
On-Region Characteristics



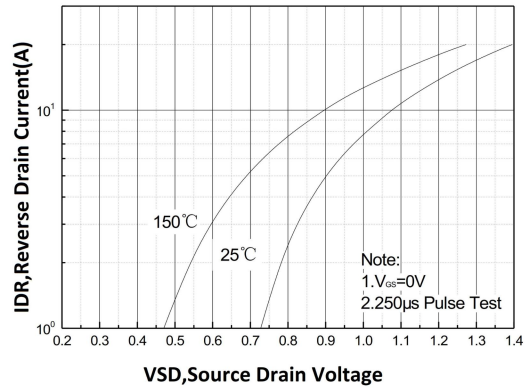
Transfer Characteristics



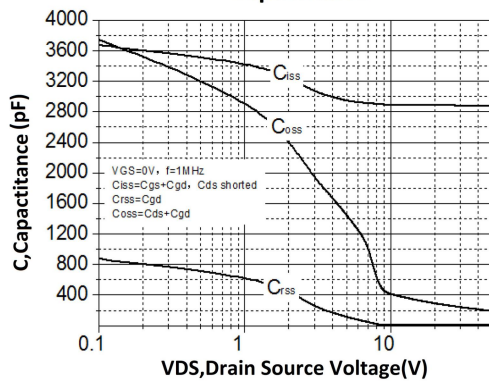
On-Resistance Variation vs Drain Current and Gate Voltage



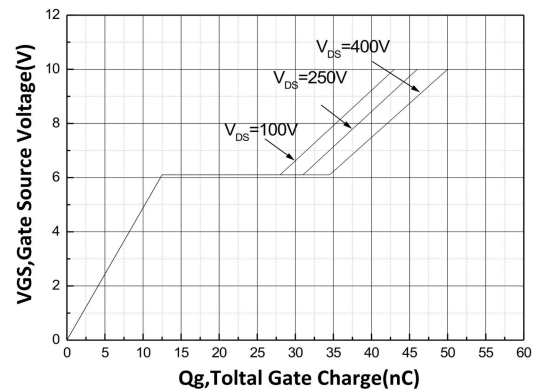
Body Diode Forward Voltage Variation vs. Source Current and Temperature



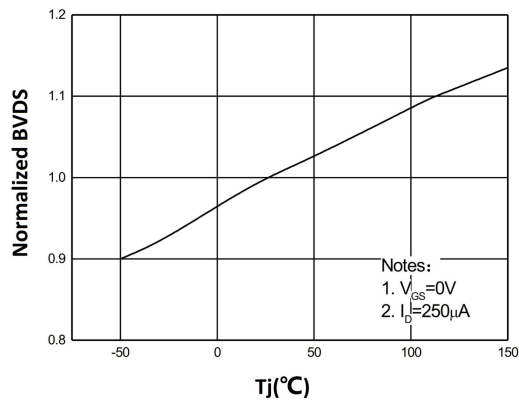
Capacitance



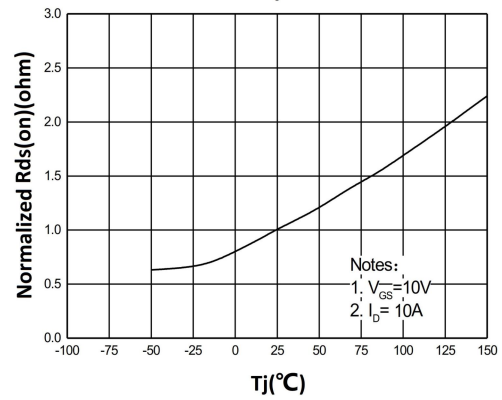
Gate Charge Characteristics



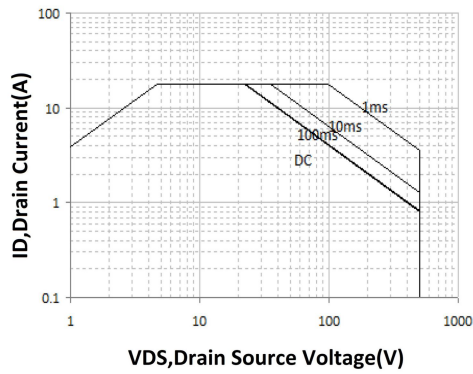
**Breakdown Voltage Variation
vs. Temperature**



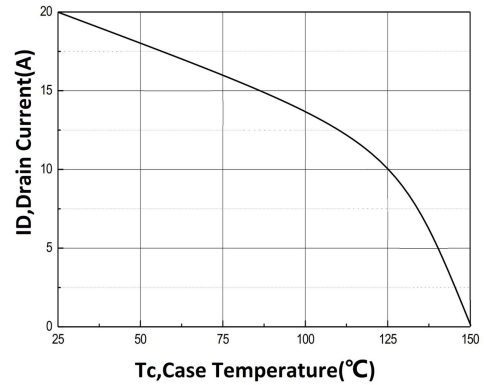
**On-Resistance Variation
vs. Temperature**



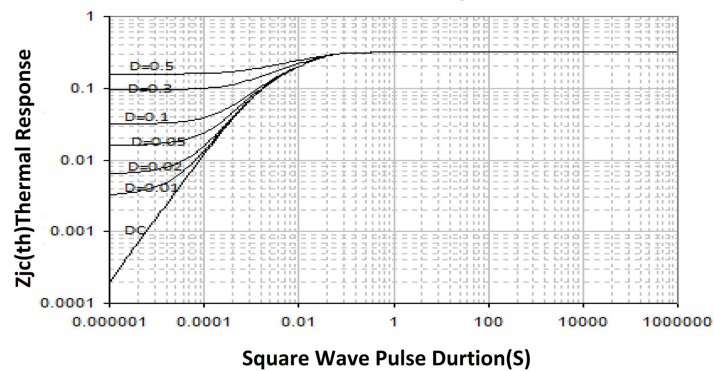
SOA



**Maximum Drain Current vs.
Case Temperature**



Transient Thermal Response Curve



Technical drawing of the TO-3PB heat sink showing front, side, and detail views with dimensions in mm.

Front View Dimensions:

- Top width: 15.6 ± 0.3
- Inner width: 14.0 ± 0.2
- Left height: 2.6 ± 0.2
- Top-left angle: $30^\circ \pm 5^\circ$
- Top-right height: 3.5 ± 0.2
- Right height (top section): 1.2 ± 0.2
- Right height (middle section): 15.0 ± 0.3
- Right height (bottom section): 1.3 ± 0.3
- Total right height: 20.0 ± 0.3
- Bottom width (between pins): 2.0 ± 0.3
- Bottom height (between pins): 20.0 ± 0.5
- Pin 1 diameter: 1.6 ± 0.3
- Pin 2 diameter: $1.0^{+0.3}_{-0.1}$
- Pin 3 diameter: 0.6 ± 0.2

Side View Dimensions:

- Top width: 4.8 ± 0.2
- Inner width: 2.0 ± 0.2
- Pin diameter: $0.6^{+0.3}_{-0.1}$

Detail View Dimensions:

- Pin diameter: 5.45 ± 0.2
- Pin height: 1.4 ± 0.3

Legend:

- TO-3PB
- Unit:mm

