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MS20N65F

Product specification

Description

The MS20N65F uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.


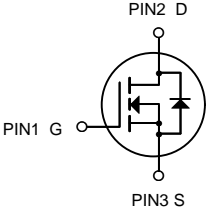

General Features

- $V_{DS}=650V, I_D=20A$
- $R_{DS(ON)} < 0.47 \Omega @ V_{GS}=10V$

Application

- High efficiency switch mode power supplies
- Power factor correction
- Electronic lamp ballast

Reference News

PACKAGE OUTLINE	N-Channel MOSFET	Marking
		
TO-220F		MS20N65F

Note : ****Representative production cycle

Absolute Maximum Ratings@ $T_j=25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	650	V
V_{GS}	Gate-Source Voltage	+30	V
$I_D @ T_C=25^\circ\text{C}$	Drain Current, $V_{GS} @ 4.5V$	20	A
I_{DM}	Pulsed Drain Current ¹	80	A
$P_D @ T_C=25^\circ\text{C}$	Total Power Dissipation	32	W
TSTG	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Electrical Characteristics ($T_C=25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
OFF CHARACTERISTICS								
Drain-Source Breakdown Voltage		BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650			V	
Drain-Source Leakage Current		I_{DSS}	$V_{DS}=650V, V_{GS}=0V$			1	μA	
Gate- Source Leakage Current	Forward	I_{GSS}	$V_G=30V, V_{DS}=0V$			100	nA	
	Reverse		$V_{GS}=-30V, V_{DS}=0V$			-100	nA	
ON CHARACTERISTICS								
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0		4.0	V	
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	$V_{GS}=10V, I_D=6A$		0.4	0.47	Ω	
DYNAMIC CHARACTERISTICS								
Input Capacitance		C_{ISS}	$V_{DS}=25V, V_{GS}=0V, f=1.0\text{ MHz}$		3234		pF	
Output Capacitance		C_{OSS}				266		pF
Reverse Transfer Capacitance		C_{RSS}				34		pF
SWITCHING CHARACTERISTICS								
Turn-On Delay Time		$t_{D(ON)}$	$V_{DD}=325V, I_D=20A, R_G=25\Omega$ (Note 1, 2)		45		ns	
Turn-On Rise Time		t_R			64		ns	
Turn-Off Delay Time		$t_{D(OFF)}$			218		ns	
Turn-Off Fall Time		t_F			84		ns	
Total Gate Charge		Q_G	$V_{DS}=480V, I_D=20A, V_{GS}=10V$ (Note 1, 2)		73		nC	
Gate-Source Charge		Q_{GS}			17		nC	
Gate-Drain Charge		Q_{GD}			29		nC	
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS								
Drain-Source Diode Forward Voltage		V_{SD}	$V_{GS}=0V, I_S=12A$			1.2	V	
Maximum Continuous Drain-Source Diode Forward Current		I_S				20	A	
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				80	A	
Reverse Recovery Time		t_{rr}	$V_{GS}=0V, I_S=12A, di_F/dt=100\text{ A}/\mu s$ (Note 1)		494		ns	
Reverse Recovery Charge		Q_{RR}			7.9		μC	

 Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

Typical Characteristics

Figure 1: Output Characteristics

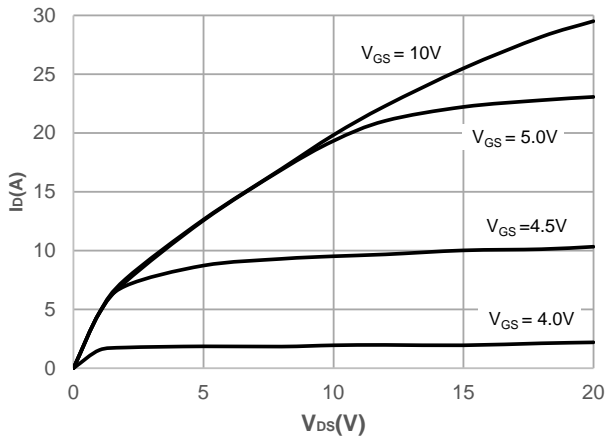


Figure 2: Typical Transfer Characteristics

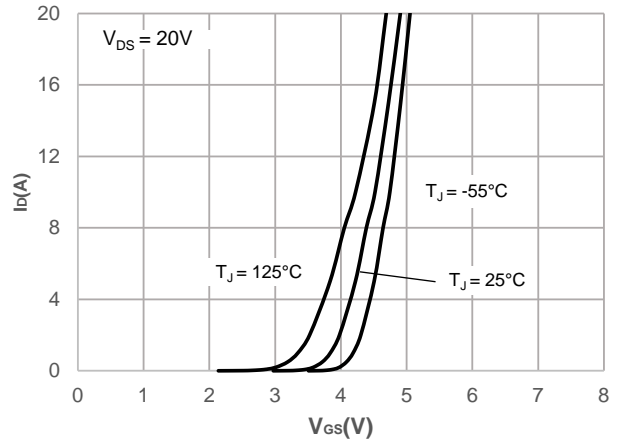


Figure 3: On-resistance vs. Drain Current

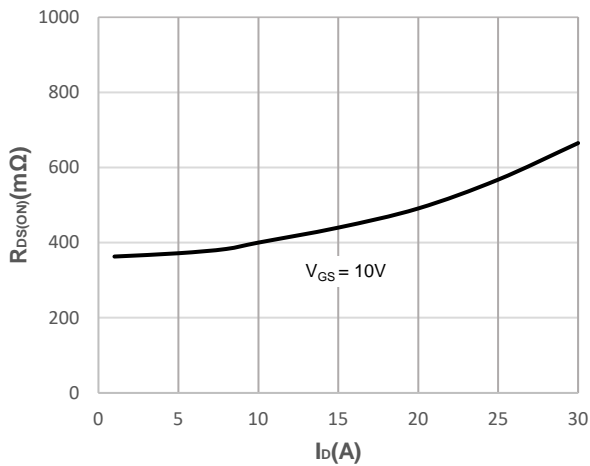


Figure 4: Body Diode Characteristics

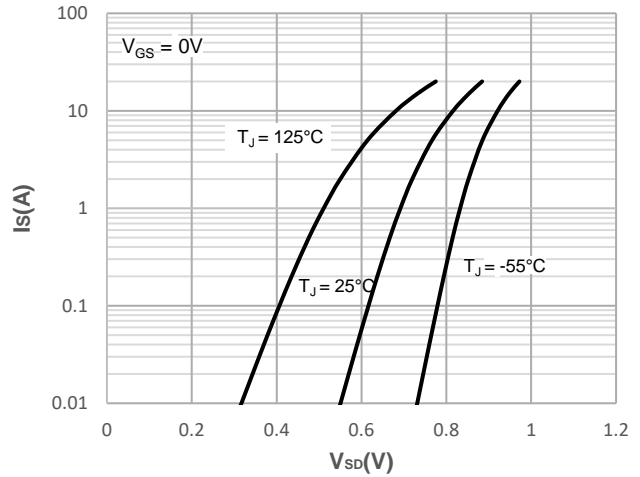


Figure 5: Gate Charge Characteristics

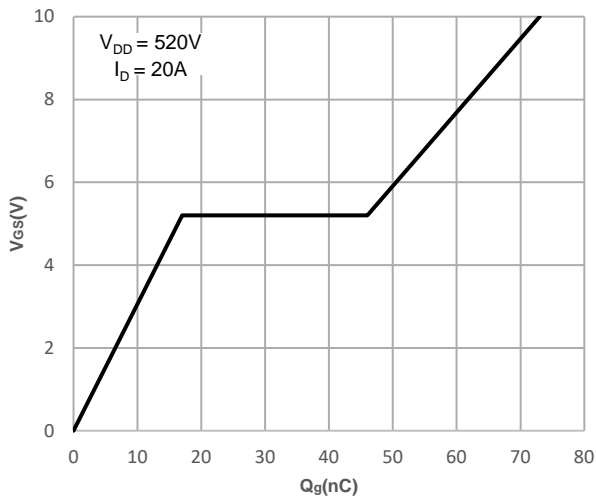


Figure 6: Capacitance Characteristics

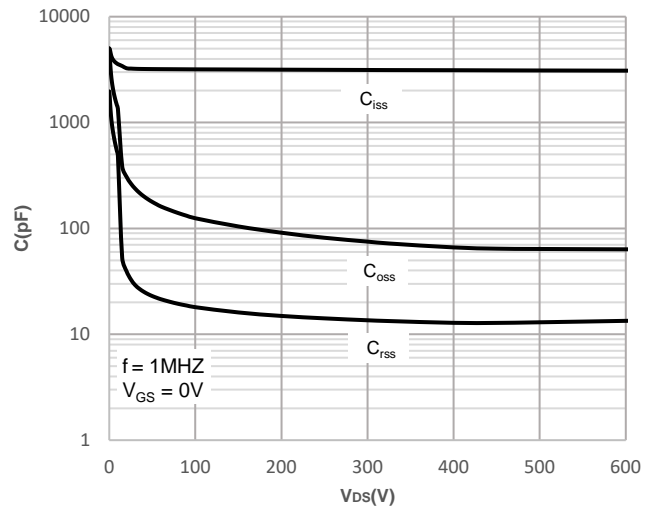


Figure 7: Normalized Breakdown voltage vs. Junction Temperature

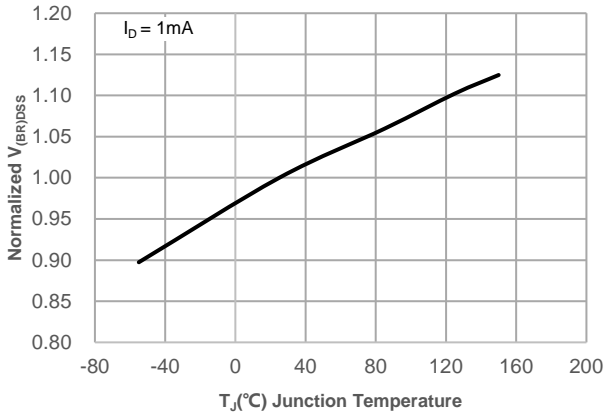


Figure 8: Normalized on Resistance vs. Junction Temperature

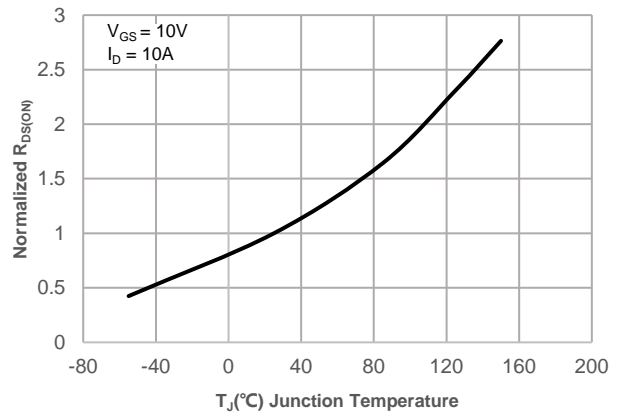


Figure 9: Maximum Safe Operating Area

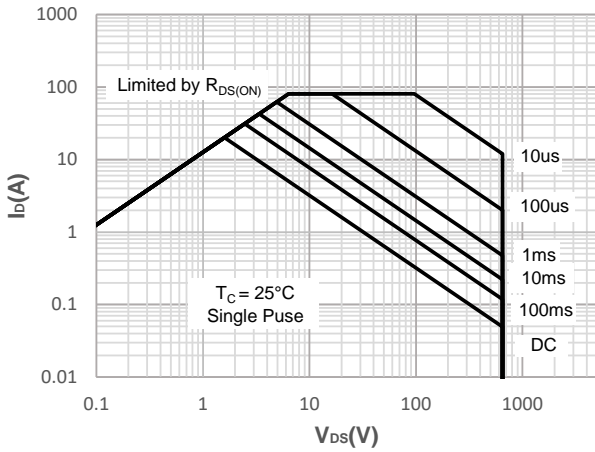


Figure 10: Maximum Continuous Driian Current vs. Case Temperature

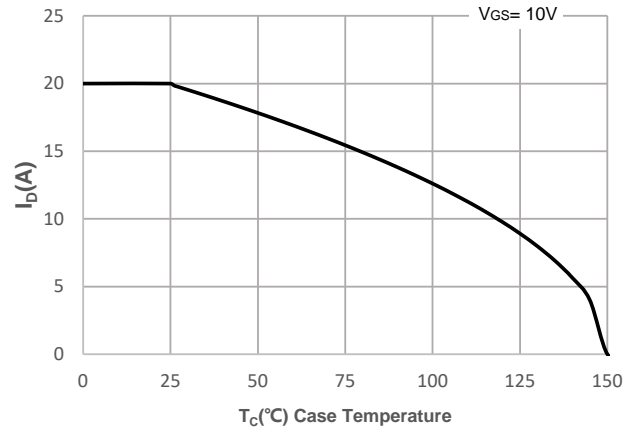


Figure 11: Normalized Maximum Transient Thermal Impedance

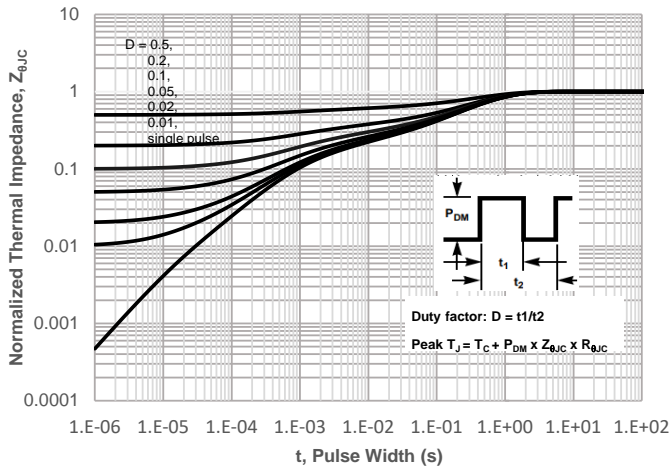
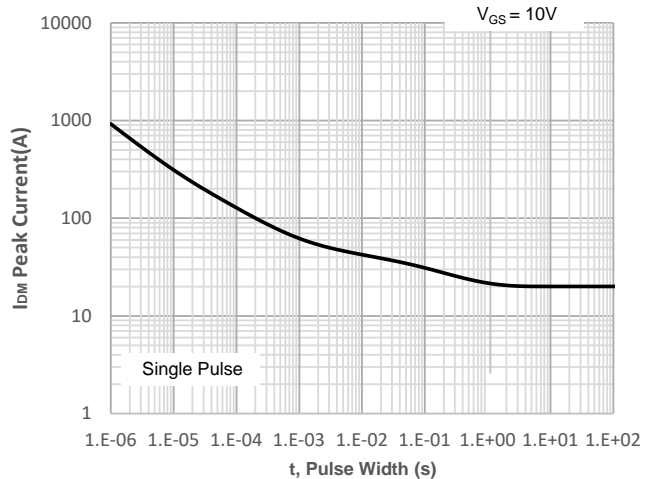


Figure 12: Peak Current Capacity



Test Circuit

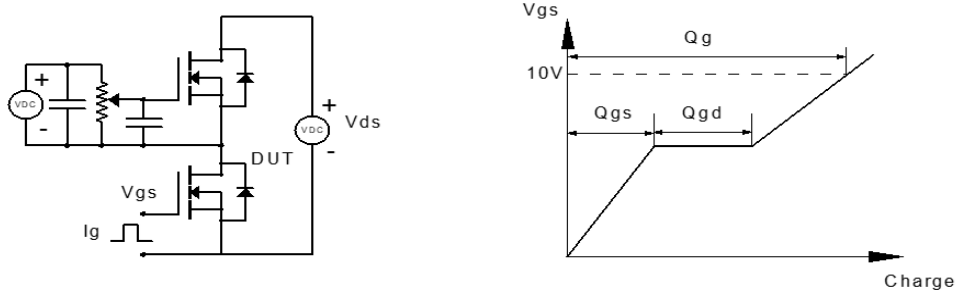


Figure 1: Gate Charge Test Circuit & Waveform

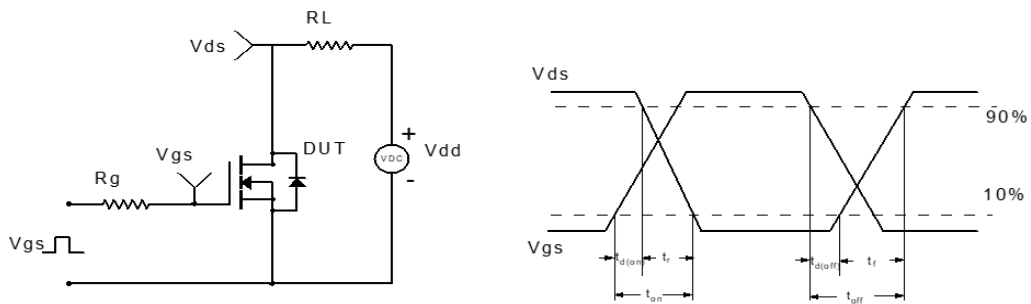


Figure 2: Resistive Switching Test Circuit & Waveform

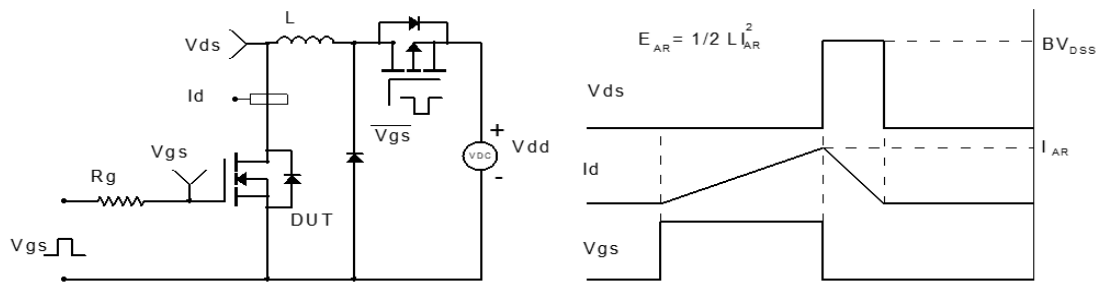


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

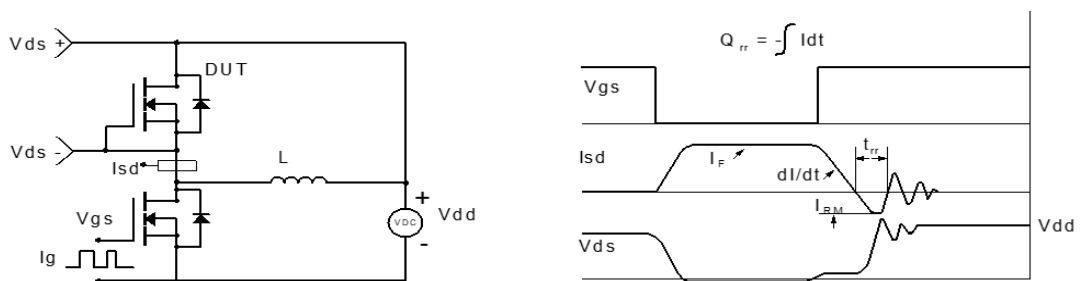
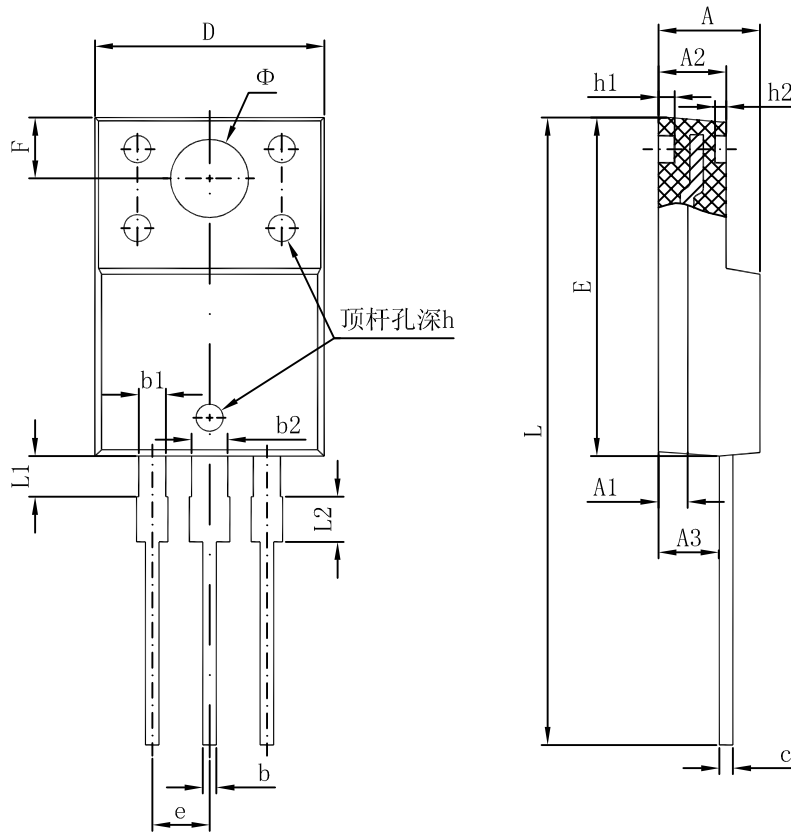


Figure 4: Diode Recovery Test Circuit & Waveform

Package Dimension TO-220F



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.300	4.700	0.169	0.185
A1	1.300 REF.		0.051 REF.	
A2	2.800	3.200	0.110	0.126
A3	2.500	2.900	0.098	0.114
b	0.500	0.750	0.020	0.030
b1	1.100	1.350	0.043	0.053
b2	1.500	1.750	0.059	0.069
c	0.500	0.750	0.020	0.030
D	9.960	10.360	0.392	0.408
E	14.800	15.200	0.583	0.598
e	2.540 TYP.		0.100 TYP.	
F	2.700 REF.		0.106 REF.	
Φ	3.500 REF.		0.138 REF.	
h	0.000	0.300	0.000	0.012
h1	0.800 REF.		0.031 REF.	
h2	0.500 REF.		0.020 REF.	
L	28.000	28.400	1.102	1.118
L1	1.700	1.900	0.067	0.075
L2	1.900	2.100	0.075	0.083

REEL SPECIFICATION

P/N	PKG	QTY
MS20N65F	TO-220F	1 tube of 50pcs/1 box of 1000pcs

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