

MOSFETs Silicon 650V N-Channel MOS
■ Applications

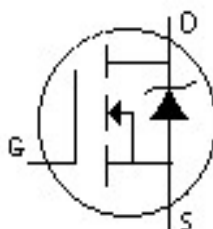
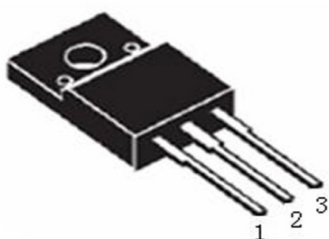
- Power factor correction (PFC)
- Switched mode power supplies(SMPS)
- Uninterruptible Power Supply (UPS)

■ Features

- Multi-Epi process SJ-FET
- Low $R_{DS(ON)}$
- Ultra Low Gate Charge
- RoHS and Halogen-Free Compliant
- 100% UIS and RG Tested

■ Product Summary

$V_{DS} @ T_{j,max}$	700	V
I_D	28	A
$R_{DS(ON)}, Typ @ 10V$	118	mΩ
Q_g	52	nC



Gate: 1
Drain: 2
Source: 3

TO-220F

Marking	Package	Packaging	Min. package quantity
MHF140R65C2	TO-220F	Tube	1000



■ Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current Tc=25°C (Note 1)	I_D	28	A
Continuous Drain Current Tc=100°C (Note 1)		19	
Drain Current-Pulsed (Note 1)	I_{DM}	112	A
Total Dissipation	P_D	30	W
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	-55-150	°C
Single Pulse Avalanche Energy (Note 2)	E_{AS}	33	mJ

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

■ Thermal Characteristics

Parameter	Symbol	Max	Unit
Maximum Junction-to-Case	$R_{\theta JC}$	4.2	°C/W
Maximum Junction-to-Ambient	$R_{\theta JA}$	80	°C/W

Note 1: Ensure that the channel temperature does not exceed 150°C.

Note 2: $V_{DD}=50V$, $T_{ch}=25^{\circ}C$ (initial), $L=0.5mH$, $R_g=25\Omega$.

Note: This transistor is sensitive to electrostatic discharge and should be handled with care.



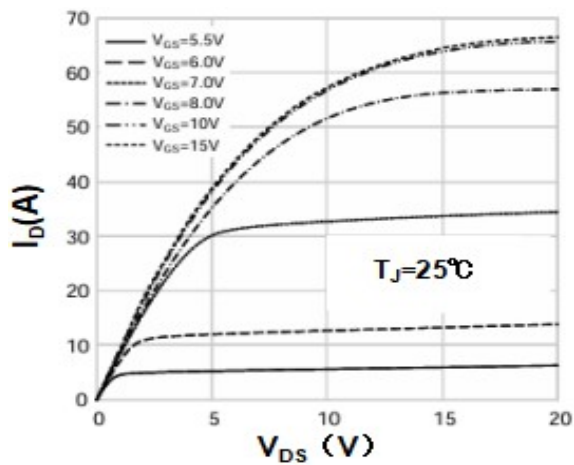
■ Electrical Characteristics (Tc=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit	
Static Parameters							
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA		650	-	-	V
			T _J =150°C	700	-	-	
Drain-Source Leakage Current	I _{DSS}	V _{DS} =650V, V _{GS} =0V		-	-	1	uA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±30V, V _{DS} =0V		-	-	±100	nA
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250uA		2.5	3.7	4.5	V
Drain-Source On Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =14A		-	118	140	mΩ
			T _J =150°C	-	297	-	
Dynamic Characteristics							
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz		-	1903	-	pF
Output Capacitance	C _{oss}			-	2098	-	pF
Reverse Transfer Capacitance	C _{rss}			-	162	-	pF
Gate Resistance	R _g	V _{DS} =0V, V _{GS} =0V, f=1.0MHz		-	1.25	-	Ω
Switching Paramters							
Turn-On Delay Time	t _{d(on)}	V _{DS} =400V, I _D =14A, V _{GS} =10V, R _G =24Ω		-	28	-	ns
Turn-On Rise Time	t _r			-	52	-	ns
Turn-Off Delay Time	t _{d(off)}			-	138	-	ns
Turn-Off Rise Time	t _f			-	44	-	ns
Total Gate Charge	Q _g	V _{DS} =400V, I _D =14A, V _{GS} =10V		-	52	-	nC
Gate-Source Charge	Q _{gs}			-	13	-	nC
Gate-Drain Charge	Q _{gd}			-	26	-	nC
Source-Drain Characteristics							
Max. Diode Forward Cuurent	I _S			-	-	28	A
Max. Pulsed Forward Cuurent	I _{SM}			-	-	112	A
Diode Forward Voltage	V _{sd}	V _{GS} =0V, I _S =14A		-	0.9	1.4	V
Reverse Recovery Time	t _{rr}	V _R =400V, I _F =14A, di/dt=100A/us		-	320	-	ns
Reverse Recovery Charge	Q _{rr}			-	5.2	-	μC

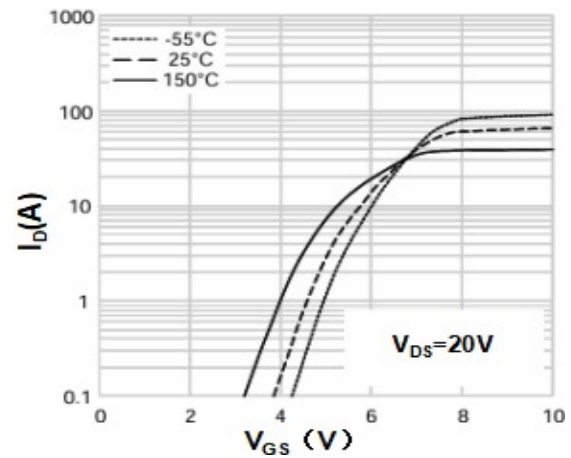




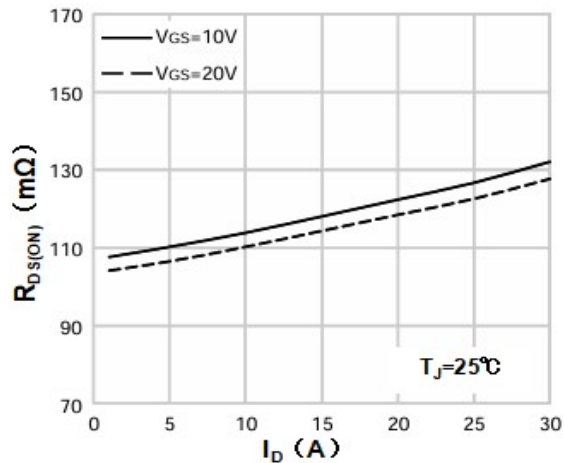
■ Characteristics Curves



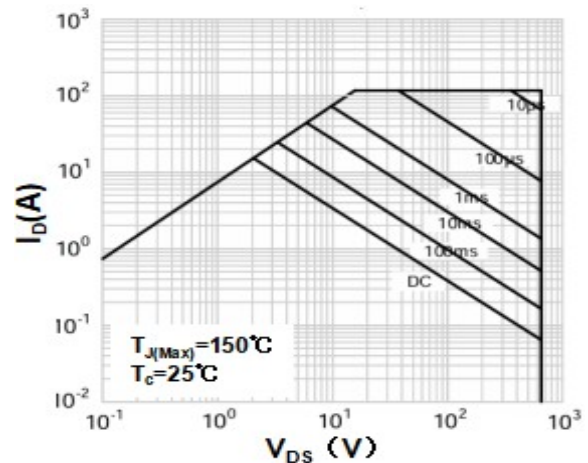
Output Characteristics



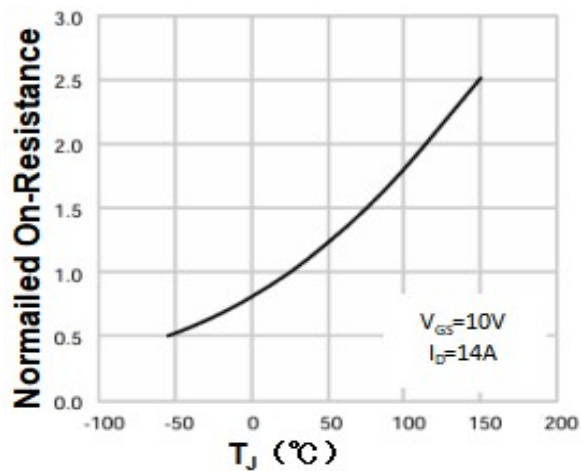
Transfer Characteristics



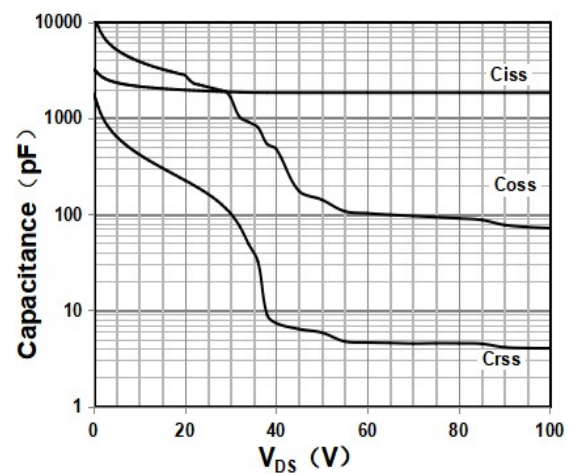
On Resistance Vs Drain Current



Maximum Safe Operating Area

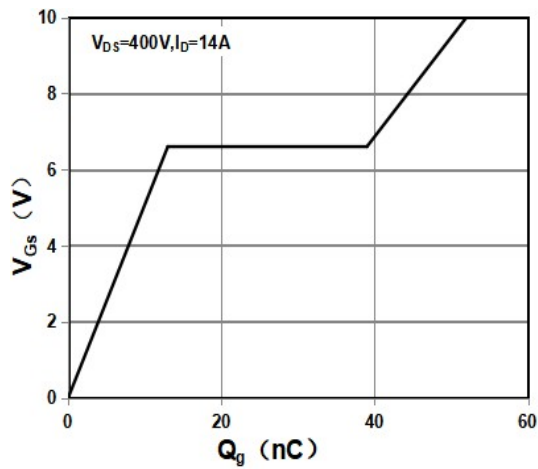


Rdson-JunctionTemperature

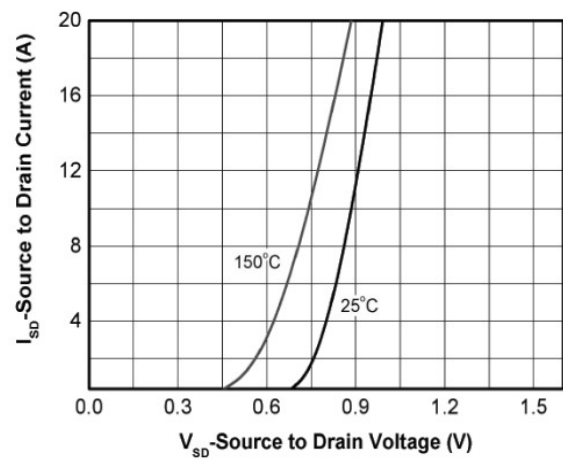


Capacitance

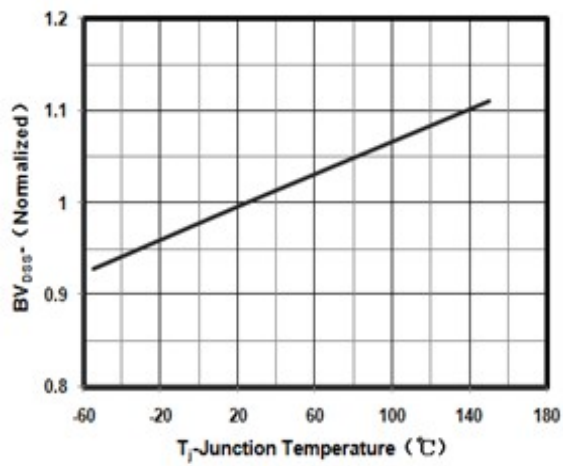




Gate Charge Waveform



Source-Drain Diode Forward Voltage



Breakdown Voltage Vs Junction Temperature

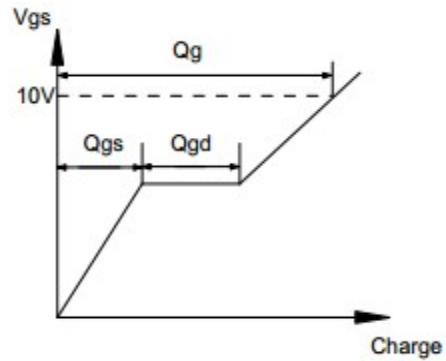
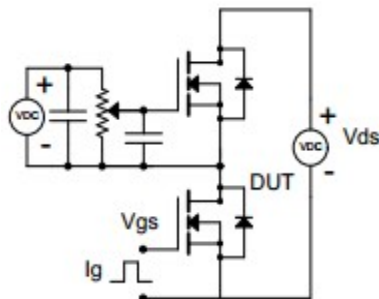
Note : The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



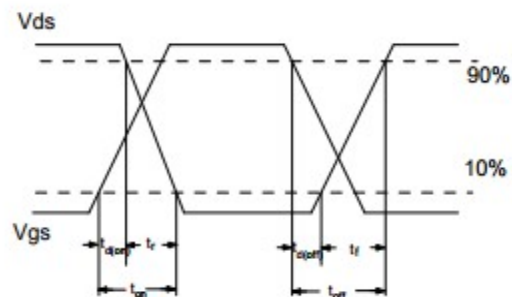
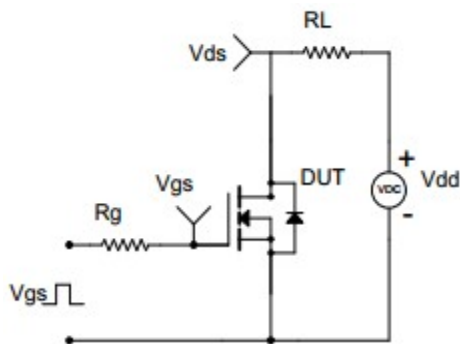


■ Test Circuit & Waveform

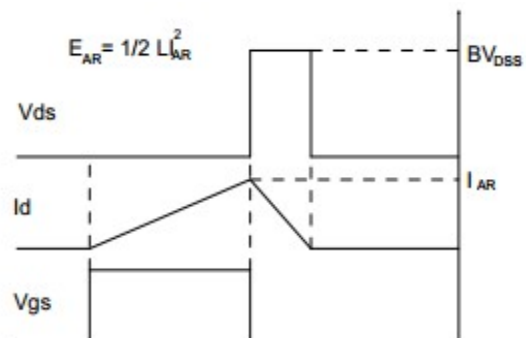
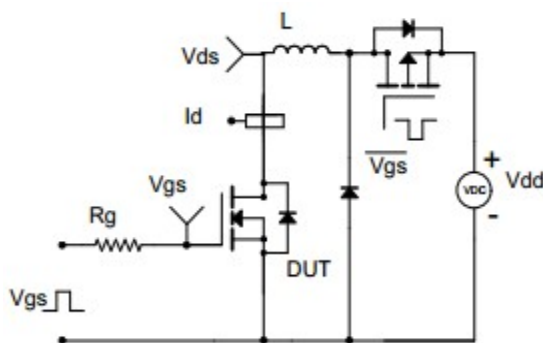
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveform



**■ TO-220F Package Dimensions**

Unit: mm

Symbol	Min	Nom	Max	Symbol	Min	Nom	Max
A	4.5		4.9	E1	6.5	7	7.5
A1	2.3		2.9	e	2.44	2.54	2.64
b	0.65		0.9	L	12.5		14.3
b1	1.1		1.7	L1	9.45		10.05
b2	1.2		1.4	L2	15		16
c	0.35		0.65	L3	3.2		4.4
D	14.5		16.5	ΦP	3		3.3
D1	6.1		6.9	Q	2.5		2.9
E	9.6		10.3				

