



HCF65R380

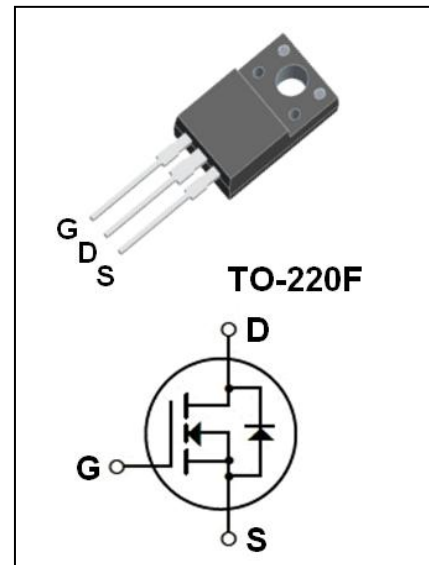
650V N-Channel Super Junction Power MOSFET

●Features:

- 11.0A, 650V, $R_{DS(on)(Typ)} = 380m\Omega @ V_{GS}=10V$
- Ultra Low Gate Charge
- Ultra Low C_{rss}
- 100% Avalanche Tested
- Fast Switching
- Improved dv/dt Capability

●Application:

- High Frequency Switching Mode Power Supply
- Active Power Factor Correction



Absolute Maximum Ratings ($T_c=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-Source Voltage	650	V
V_{GSS}	Gate-Source Voltage	± 30	V
I_D	Drain Current	- Continuous ($T_c=25^\circ C$)	11.0*
		- Continuous ($T_c=100^\circ C$)	7.0*
I_{DM}	Drain Current -Pulsed (Note1)	33*	A
P_D	Power Dissipation ($T_c = 25^\circ C$) -Derate above $25^\circ C$	32	W
		0.26	W/ $^\circ C$
E_{AS}	Single Pulsed Avalanche Energy (Note2)	272	mJ
I_{AR}	Avalanche Current (Note1)	5.5	A
E_{AR}	Repetitive Avalanche Energy, t_{AR} limited by T_{jmax} (Note1)	0.5	mJ
dv/dt	Drain Source voltage slope, $V_{DS} \leq 480V$	50	V/ns
dv/dt	Reverse diode dv/dt, $V_{DS} \leq 480V, I_{SD} \leq I_D$	15	V/ns
T_j	Operating Junction Temperature	150	$^\circ C$
T_{stg}	Storage Temperature Range	-55 to +150	$^\circ C$

* Drain Current Limited by Maximum Junction Temperature.

Thermal Characteristics

Symbol	Parameter	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	3.9	$^\circ C / W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	80	$^\circ C / W$



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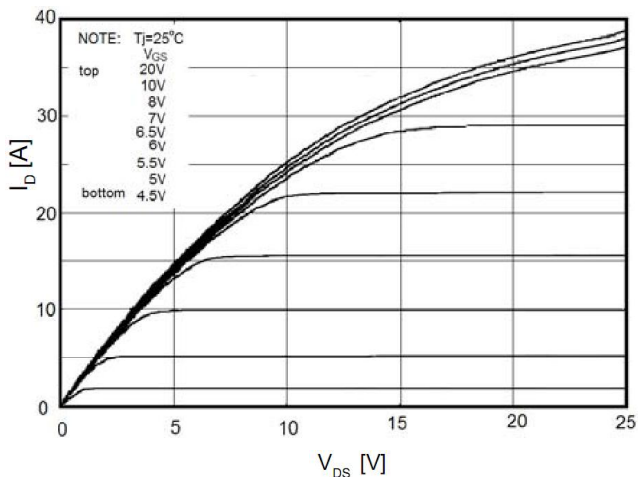
Electrical Characteristics (T_c=25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV _{DSS}	Drain-source Breakdown Voltage	V _{GS} =0V, I _D =250μA	650	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =650V, V _{GS} =0V	--	--	1	μA
		V _{DS} =650V, T _c =125°C	--	--	100	μA
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} =+30V, V _{DS} =0V	--	--	100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} =-30V, V _{DS} =0V	--	--	-100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	2.0	--	4.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =10 V, I _D =5.5A	--	380	420	mΩ
g _{FS}	Forward Transconductance	V _{DS} =20 V, I _D =5.5A	--	7.7	--	S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =50V, V _{GS} =0V, f=1.0MHz	--	695	--	pF
C _{oss}	Output Capacitance		--	53	--	pF
C _{rss}	Reverse Transfer Capacitance		--	2.5	--	pF
Q _g	Total Gate Charge	V _{DS} = 480V, I _D = 11 A, V _{GS} = 10 V	--	14.5	--	nC
Q _{gs}	Gate-Source Charge		--	3.8	--	nC
Q _{gd}	Gate-Drain Charge		--	5.3	--	nC
R _G	Intrinsic gate resistance	f=1MHz open drain		1.9		Ω
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = 380V, I _D = 5.5 A, R _G = 6.8 Ω, V _{GS} =10 V	--	24	--	ns
t _r	Turn-On Rise Time		--	24.3	--	ns
t _{d(off)}	Turn-Off Delay Time		--	34.2	--	ns
t _f	Turn-Off Fall Time		--	36.2	--	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _{SD}	Maximum Continuous Drain-Source Diode Forward Current		--	--	11	A
I _{SDM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	33	A
V _{SD}	Drain-Source Diode Forward Voltage	T _J = 25°C, V _{GS} = 0V, I _{SD} = 11.0A	--	--	1.2	V
t _{rr}	Reverse Recovery Time	T _J = 25°C, I _F = 11.0A, dI _F / dt = 100A/μs	--	275	--	ns
Q _{rr}	Reverse Recovery Charge		--	2.9	--	μC
I _{rrm}	Peak Reverse Recovery Current		--	20.5	--	A

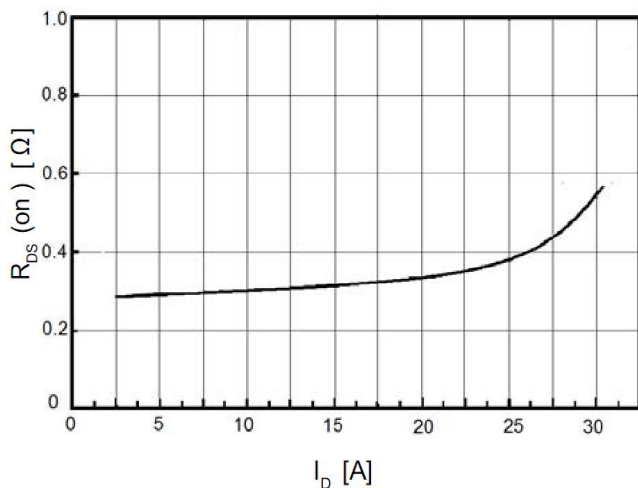
Notes:

- 1、Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
- 2、T_J = 25°C, V_{DD} = 50V, V_G = 10V, R_G = 25 Ω.

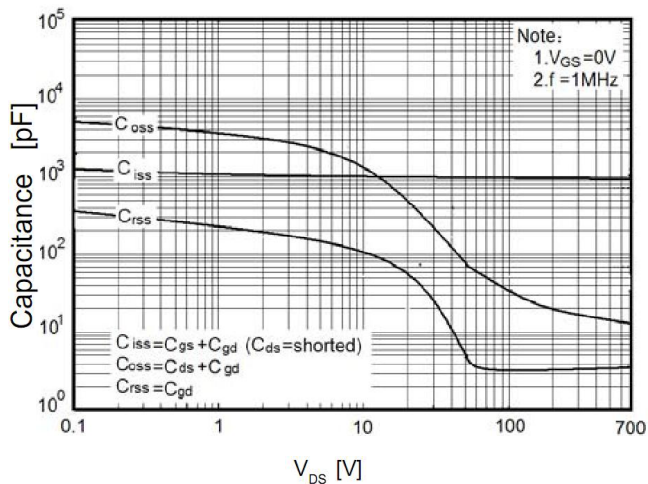
On-Regin Characteristics



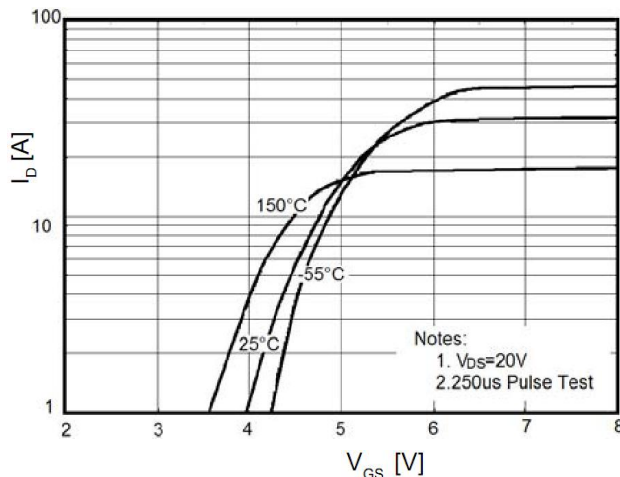
On-Resistance Variation vs. Drain Current and Gate Voltage



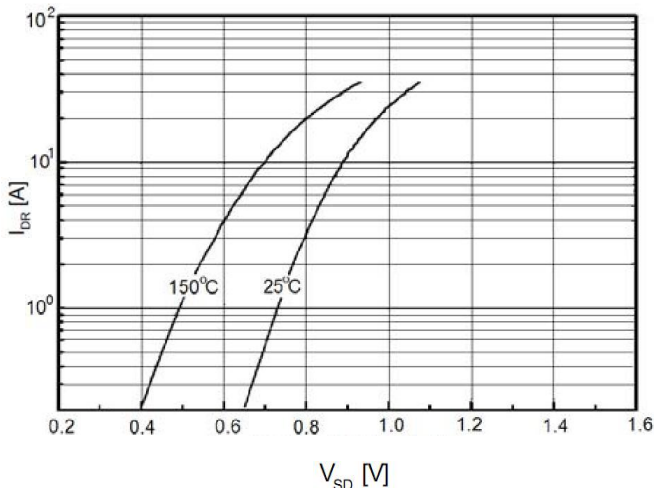
Capacitance Characteristics



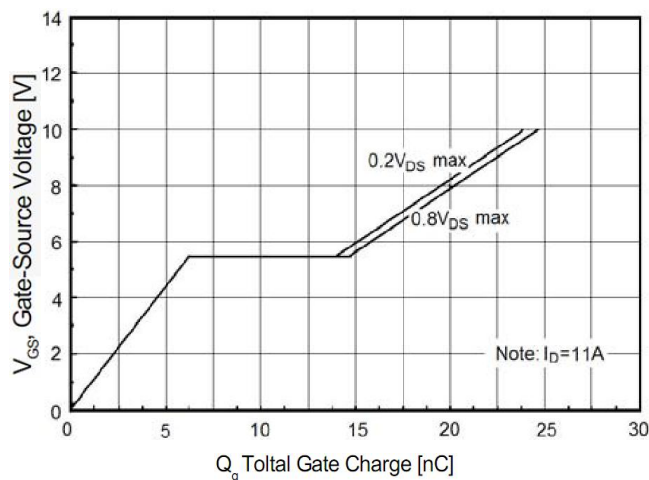
Transfer Characteristics



Body Diode Forward Voltage Variation vs. Source Current and Temperature



Gate Charge Characteristics

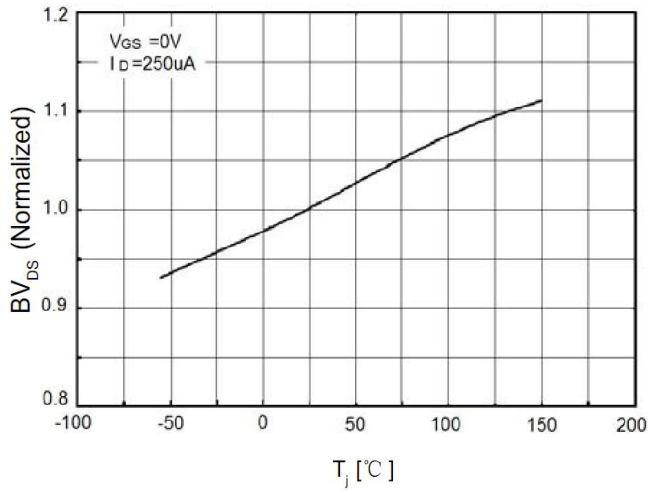




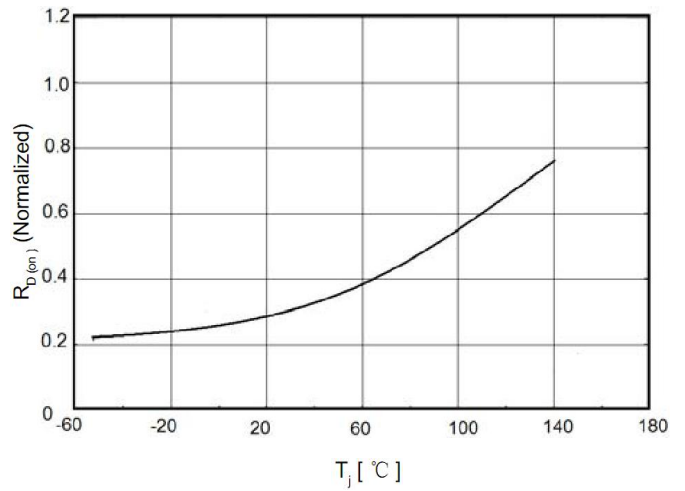
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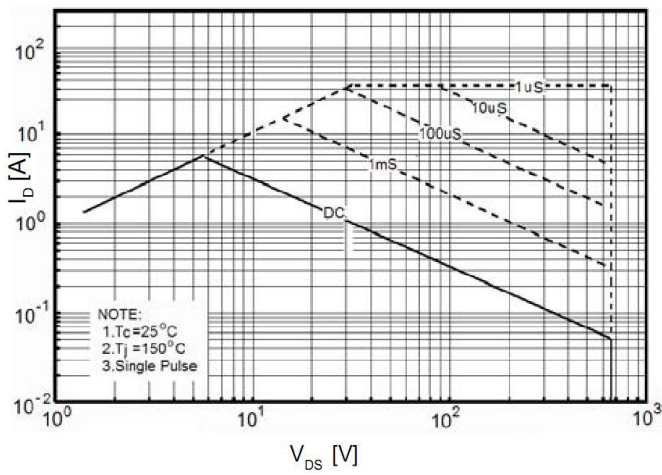
Breakdown Voltage Variation vs. Temperature



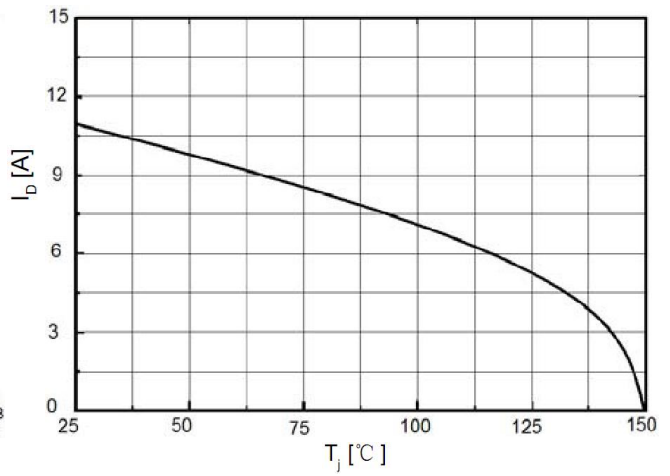
On-Resistance Variation vs. Temperature



Maximum Safe Operating Area



Maximum Drain Current Vs. Case Temperature



TO-220F Package Dimensions

UNIT: mm

SYMBOL	min	nom	max	SYMBOL	min	nom	max
A	9.80		10.60	D		2.54	
A1		7.00		D1	1.15		1.55
A2	2.90		3.40	D2	0.60		1.00
A3	9.10		9.90	D3	0.20		0.50
B1	15.40		16.40	E	2.24		2.84
B2	4.35		4.95	E1		0.70	
B3	6.00		7.40	E2		1.0×45°	
C	3.00		3.70	E3	0.35		0.65
C1	15.00		17.00	E4	2.30		3.30
C2	8.80		10.80	α (度)		30°	

