

WCR190N65TF

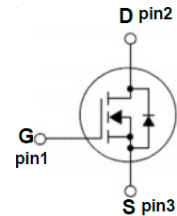
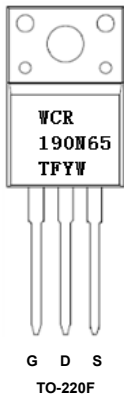
650V N-Channel Super Junction MOSFET

Description

The WCR190N65 series is new generation of high voltage MOSFET family that is utilizing an advanced charge balance mechanism for outstanding low on-resistance and lower gate charge performance. This advanced technology has been tailored to minimize conduction loss, provide superior switching performance, and withstand extreme dv/dt rate and higher avalanche energy. This device is suitable for various AC/DC power conversion in switching mode operation for higher efficiency.

Features

- 700V@ $T_J=150^{\circ}\text{C}$
- Typ. $R_{DS(on)}=0.15\Omega$
- Low gate charge
- 100% avalanche tested
- 100% R_g tested



Order Information

Device	Package	Marking	Units/Tube
WCR190N65TF-3/T	TO-220F	WCR190N65TFYW ⁽¹⁾	50

Note 1: WCR190N65TF=Device code ;Y=Year ;W=Week (A-z);

Absolusion Maximum Ratings $T_A=25^{\circ}\text{C}$ unless otherwise noted			
Parameter	Symbol	WCR190N65TF	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	± 30	
Continuous Drain Current ^A	$T_C=25^{\circ}\text{C}$	9.9	A
	$T_C=100^{\circ}\text{C}$	6.3	
Pulsed Drain Current	I_{DM}	60	A
Single Pulsed Avalanche Energy ^B	E_{AS}	420	mJ
Power Dissipation	$T_C=25^{\circ}\text{C}$	46	W
	Derate above 25°C	0.37	W/ $^{\circ}\text{C}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55~150	$^{\circ}\text{C}$
Lead Temperature	T_L	260	$^{\circ}\text{C}$
Thermal Resistance Ratings			
Maximum Junction-to-Ambient	$R_{\theta JA}$	54	$^{\circ}\text{C}/\text{W}$
Maximum Junction-to-Case	$R_{\theta JC}$	2.7	

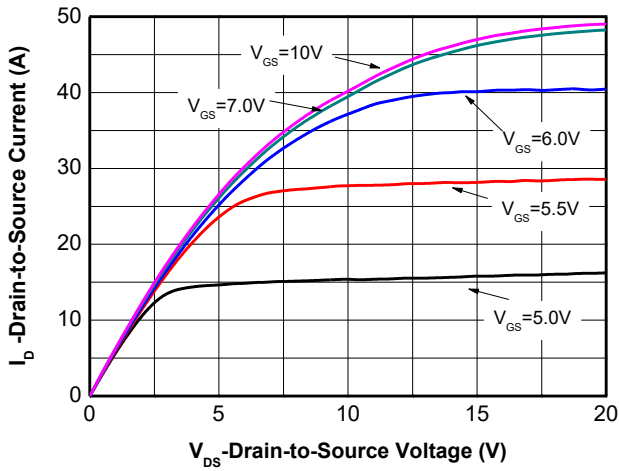
Electronics Characteristics (T_A=25°C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0 V, I _D = 250uA, T _J =25°C	650			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =650V, V _{GS} = 0V, T _J =25°C			1	uA
Gate-to-source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±30V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 500uA	2	3	4	V
Drain-to-source On-resistance	R _{DS(on)} ^C	V _{GS} = 10V, I _D = 7.3A		0.15	0.19	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 1 MHz, V _{DS} = 400 V		1621		pF
Output Capacitance	C _{OSS}			42.6		
Reverse Transfer Capacitance	C _{RSS}			4.3		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 10 V, V _{DS} = 400 V, I _D = 20 A		40.4		nC
Gate-to-Source Charge	Q _{GS}			9		
Gate-to-Drain Charge	Q _{GD}			14		
Gate resistance	R _g	V _{GS} =0V ,F=1MHZ,drain open		9.3		Ω
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(on)}	V _{GS} = 10V, V _{DS} = 400 V, I _D = 10A, R _G =10 Ω		20.4		ns
Rise Time	t _r			19.4		
Turn-Off Delay Time	t _{d(off)}			95.5		
Fall Time	t _f			36		
Drain to Source Diode Characteristics and Maximum Ratings						
Forward Voltage	V _{SD}	V _{GS} = 0 V, I _S =11 A			1.5	V
Body-Diode Continuous Current	I _S			18		A
Body-Diode Pulsed Current	I _{SM}			60		A
Body Diode Reverse Recovery Time	T _{rr}	I _F =10A, di/dt=100A/us, V _{DS} =400V		258		nS
Body Diode Reverse Recovery Charge	Q _{rr}			3.4		uC
Peak reverse recovery Current	I _{rrm}			27		A

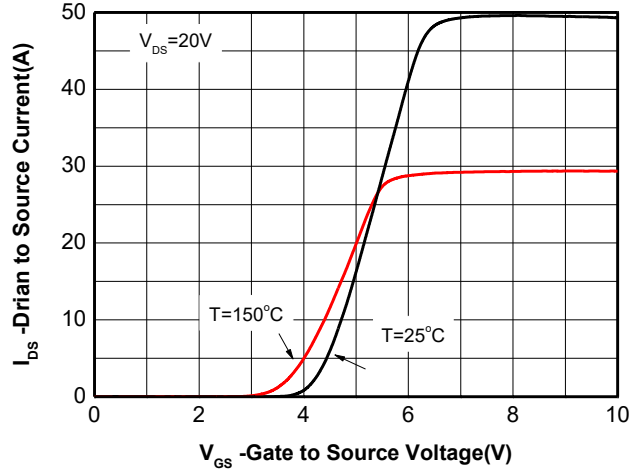
NOTES:

- A. Drain current limited by maximum junction temperature. Maximum duty cycle D=0.75
- B. L=100mH, I_{AS}=2.9A, V_{DD}=50V, Starting T_J=25°C
- C. Pulse Test: Pulse width ≤300us, Duty Cycle ≤2% sensitively Independent of Operating Temperature Typical Characteristics

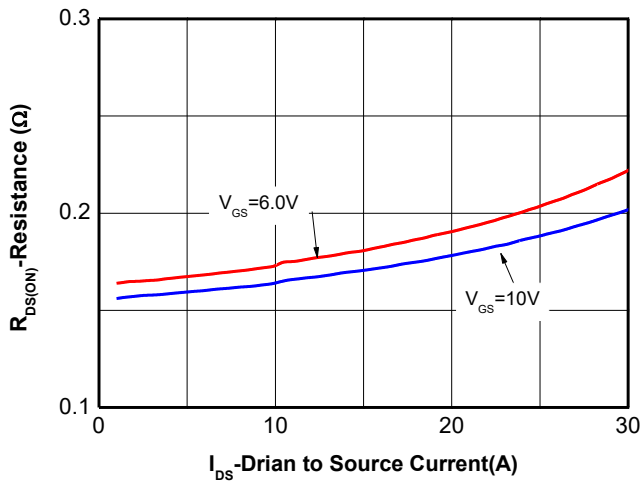
Typical Characteristics ($T_A=25^\circ\text{C}$, unless otherwise noted)



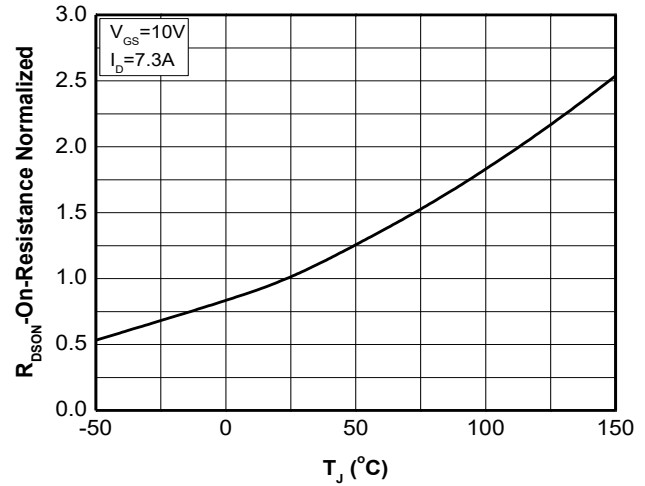
Output characteristics



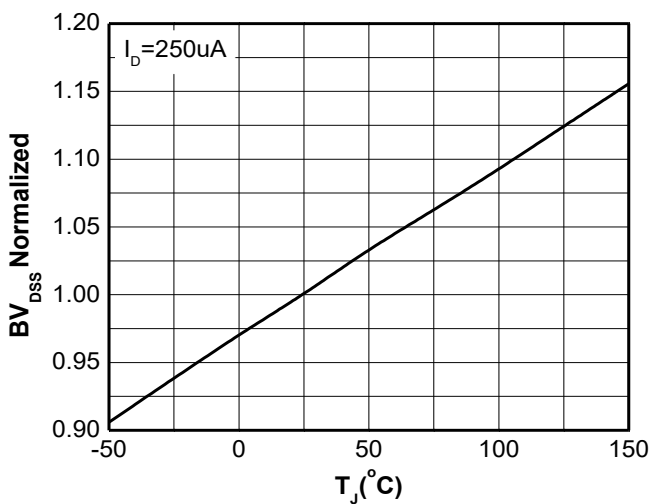
Transfer characteristics



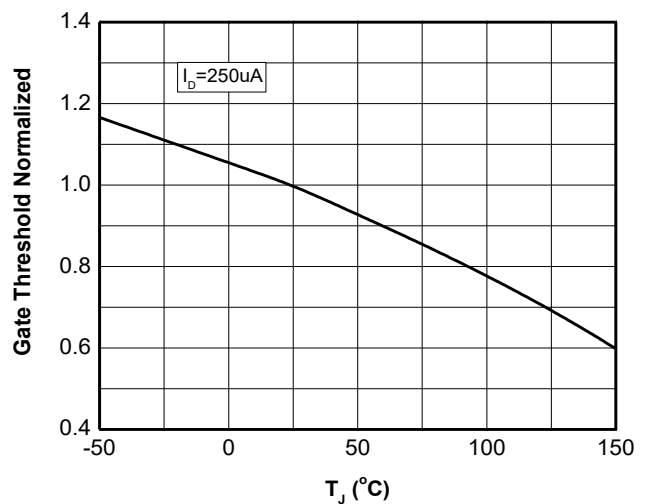
On-Resistance vs. Drain current



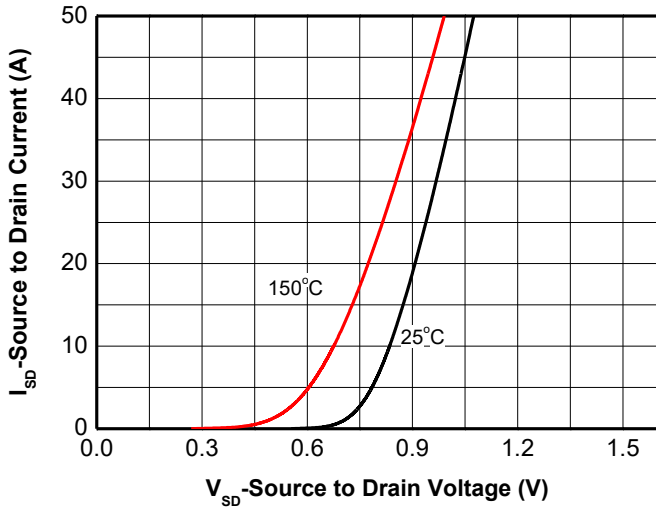
On-Resistance vs. Junction temperature



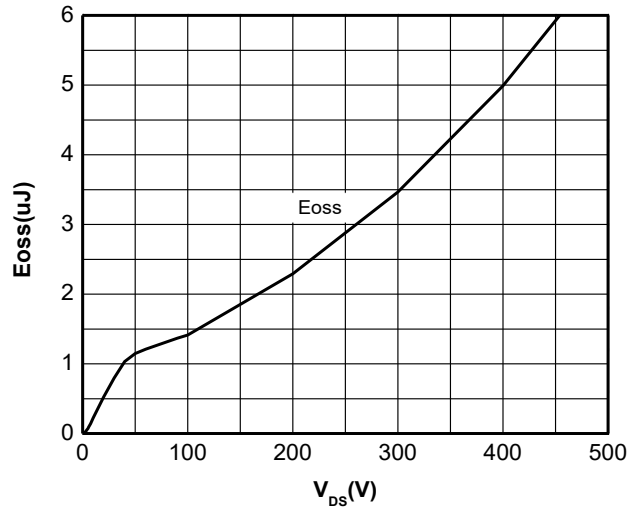
Breakdown Voltage vs. Junction temperature



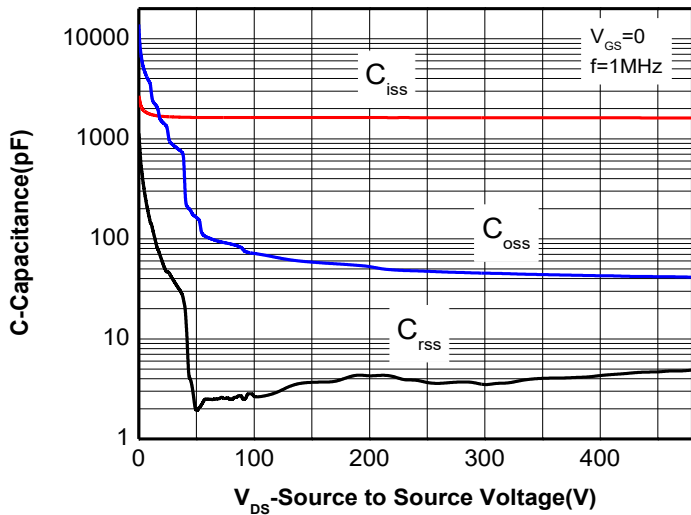
Threshold voltage vs. Junction temperature



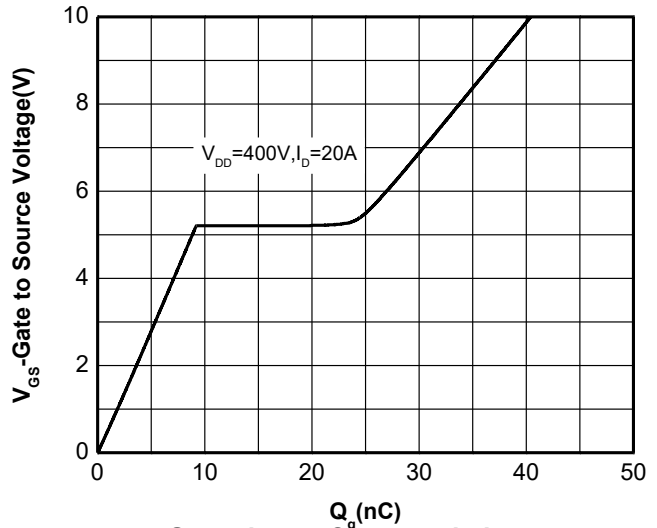
Body diode forward voltage



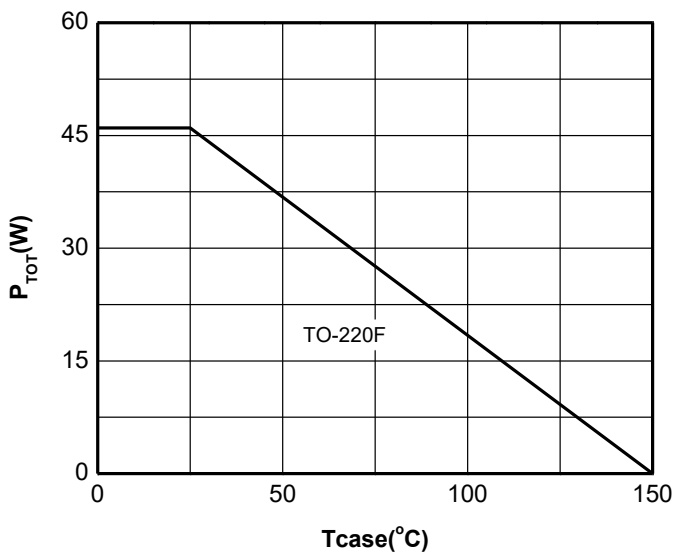
Cosstored Energy



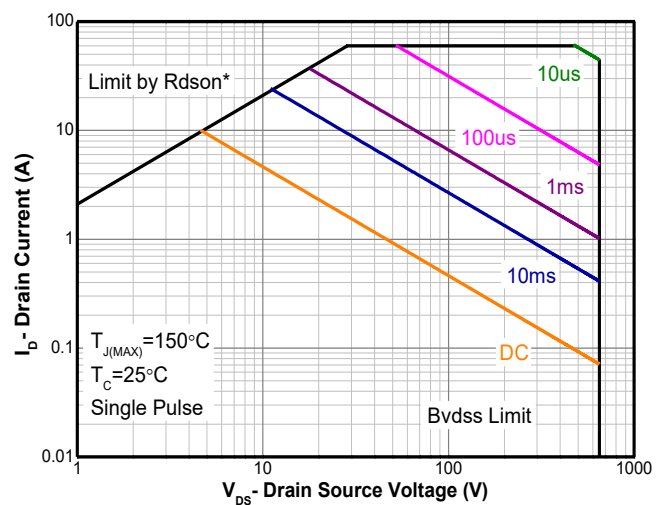
Capacitance



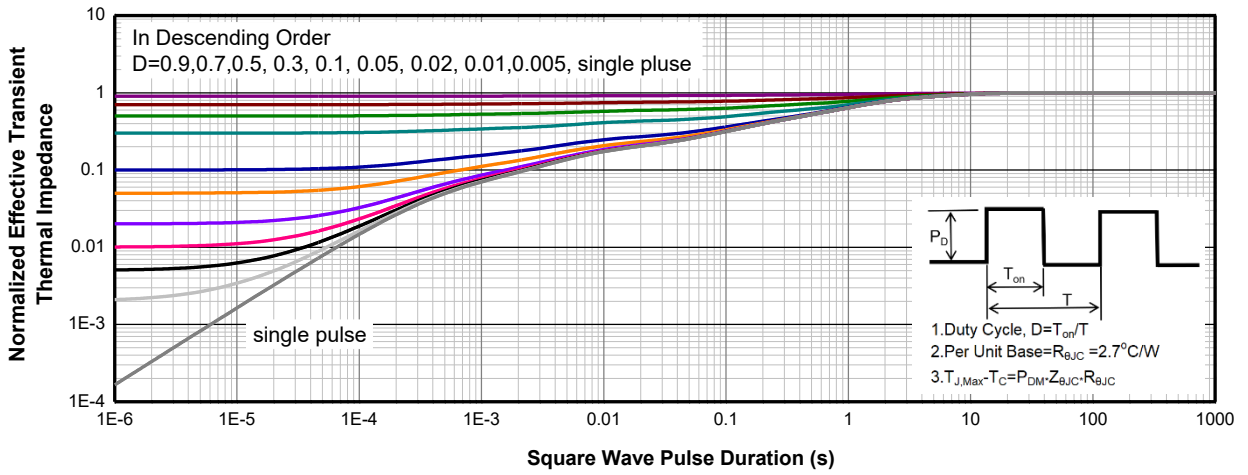
Gate charge Characteristics



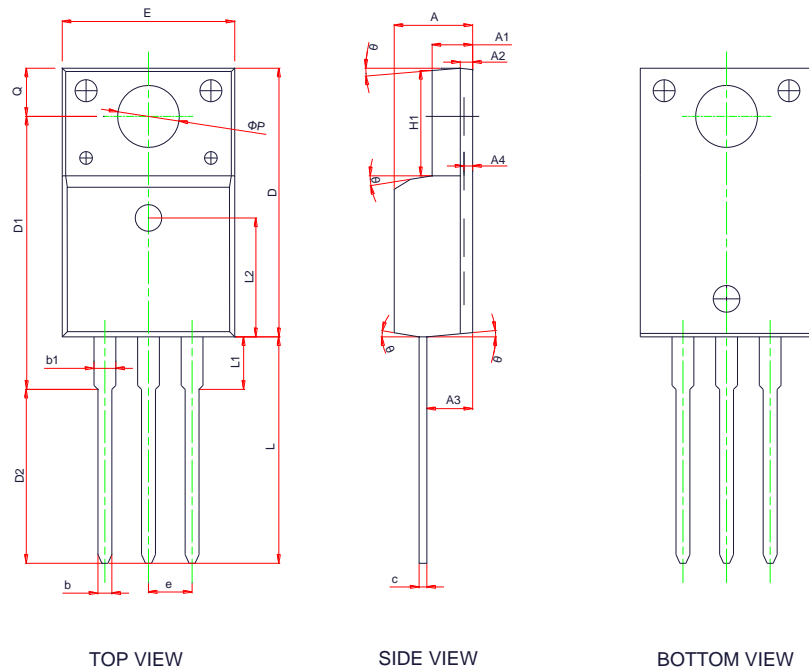
Power dissipation



Safe operating area



TO-220F Transient thermal response(Junction to case)

PACKAGE OUTLINE DIMENSIONS
TO-220F-3L


Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	4.50	4.72	4.90
A1	2.45	2.56	2.65
A2	0.72Ref		
A3	2.68	2.78	2.88
A4	-	-	0.45
b	0.70	0.80	0.90
b1	1.18	1.28	1.38
c	0.45	0.52	0.60
D	15.67	15.87	16.07
D1	15.55	15.75	15.95
E	9.96	10.16	10.36
e	2.45BSC		
H1	6.48	6.68	6.88
L	12.68	12.98	13.28
L1	-	-	3.50
L2	2.54BSC		
φP	3.08	3.18	3.28
Q	3.20	-	3.40
θ	3°	5°	7°