

650V N-Channel Power MOSFET

Features

- High Voltage: $BV_{DSS}=650V(\text{Min.})$
- I_D : 12A
- Robust high voltage termination
- Avalanche energy specified
- Fast diode recovery time

Application

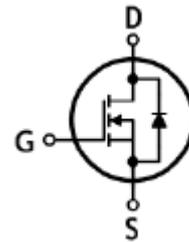
- Ballast Bridge
- Switch Mode Power Supplier
- Power Factor Correction
- Lighting



TO-262

Pin Definition

1. Gate
2. Drain
3. Source



Ordering Information

Type NO	Marking	Package Code
WMC12N65S	12N65C	TO-262

Absolute maximum ratings ($T_C=25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Rating	Unit	
Drain-source voltage	V_{DSS}	650	V	
Gate-source voltage	V_{GSS}	± 30	V	
Drain current (DC)	I_D	$T_C=25^\circ\text{C}$	12	A
		$T_C=100^\circ\text{C}$	7.4	A
Drain current (Pulsed) ①	I_{DM}	48	A	
Single avalanche energy ②	E_{AS}	500	mJ	
Power dissipation	P_D	156	W	
Junction temperature	T_J	150	$^\circ\text{C}$	
Storage temperature range	T_{stg}	-55~150	$^\circ\text{C}$	

* Limited by maximum junction temperature

Characteristic	Symbol	Max	Unit	
Thermal resistance	Junction-case	$R_{th(J-C)}$	0.8	$^\circ\text{C}/\text{W}$
	Junction-ambient	$R_{th(J-A)}$	62.5	

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

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	$I_D=250\ \mu\text{A}, V_{GS}=0\text{V}$	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250\ \mu\text{A}, V_{DS}=V_{GS}$	2.0	-	4.0	V
Drain-source cut-off current	I_{DSS}	$V_{DS}=600\text{V}, V_{GS}=0\text{V}, T_C=25^\circ\text{C}$	-	-	1	μA
		$V_{DS}=480\text{V}, V_{GS}=0\text{V}, T_C=125^\circ\text{C}$	-	-	10	μA
Gate leakage current	I_{GSS}	$V_{DS}=0\text{V}, V_{GS}=\pm 30\text{V}$	-	-	± 0.1	μA
Drain-source on-resistance ③	$R_{DS(on)}$	$V_{GS}=10\text{V}, I_D=6\text{A}$	-	0.58	0.65	Ω
Forward transfer conductance ③	g_{fs}	$V_{DS}=40\text{V}, I_D=6\text{A}$	-	11	-	S
Input capacitance	C_{iss}	$V_{DS}=25\text{V}, V_{GS}=0\text{V}$ $f=1\ \text{MHz}$	-	1760	-	pF
Output capacitance	C_{oss}		-	158	-	
Reverse transfer capacitance	C_{rss}		-	22	-	
Turn-off delay time ③	$t_{d(off)}$	$V_{DD}=300\text{V}, I_D=12\text{A}$ $R_G=25\Omega$	-	155	-	ns
Total gate charge ③	Q_g	$V_{DD}=480\text{V}, V_{GS}=10\text{V}$ $I_D=12\text{A}$	-	35	-	nC
Gate-source charge ③	Q_{gs}		-	9.8	-	
Gate-drain charge ③	Q_{gd}		-	11.5	-	

Source-Drain Diode Ratings and Characteristics ($T_C=25^\circ\text{C}$ unless otherwise noted)

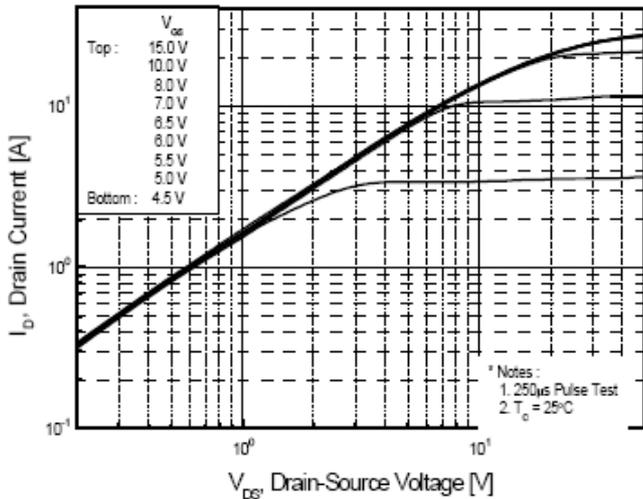
Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Source current (DC)	I_S	-	-	-	12	A
Forward voltage ③	V_{SD}	$V_{GS}=0\text{V}, I_{SD}=12\text{A}$	-	-	1.4	V
Reverse recovery time ③	t_{rr}	$I_{SD}=12\text{A}, V_{GS}=0\text{V}$ $dI_F/dt=100\text{A}/\mu\text{s}$	-	420	-	ns
Reverse recovery charge ③	Q_{rr}		-	4.2	-	μC

Note ;

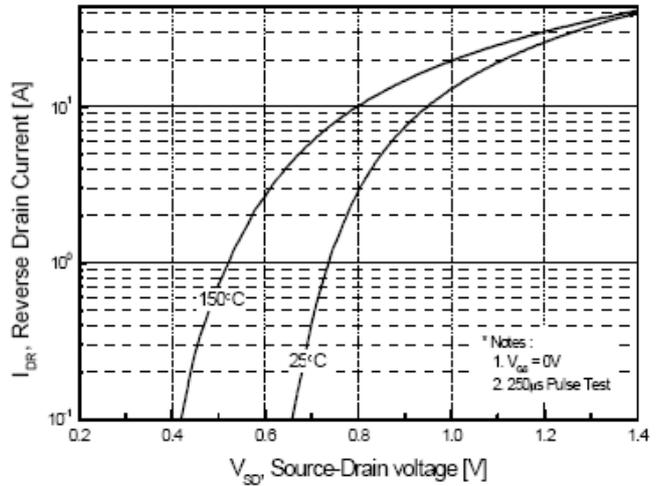
1. Repetitive rating: Pulse width limited by maximum junction temperature
2. Starting $T_j=25^\circ\text{C}$, $V_{DD}=50\text{V}$, $L=10\text{mH}$, $R_G=25\Omega$, $I_{AS}=12\text{A}$
3. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$

Electrical Characteristic Curves

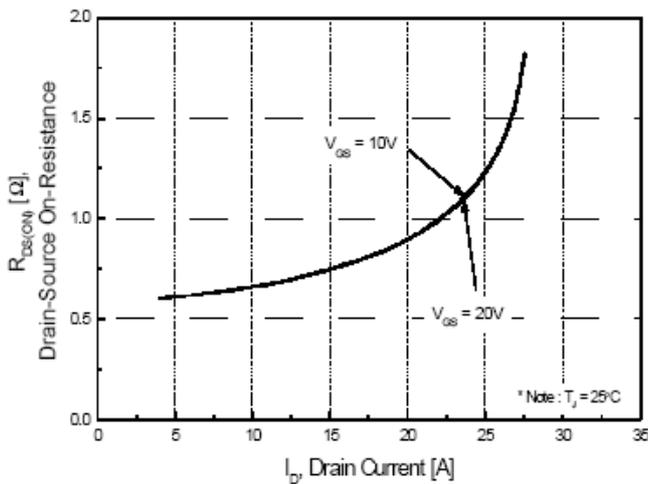
Typical Output Characteristics



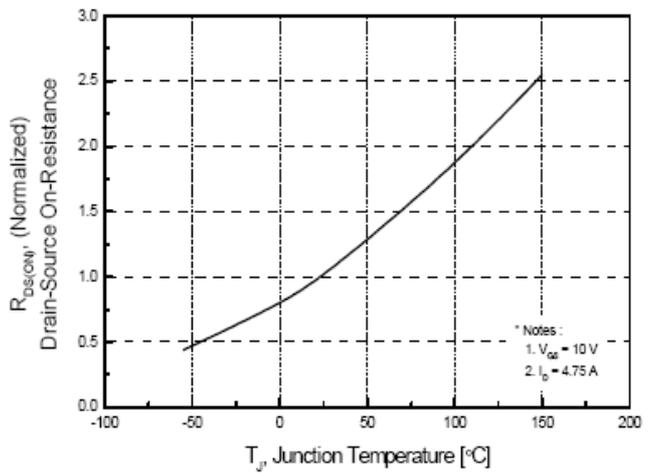
Typical Source-Drain Diode Forward Voltage



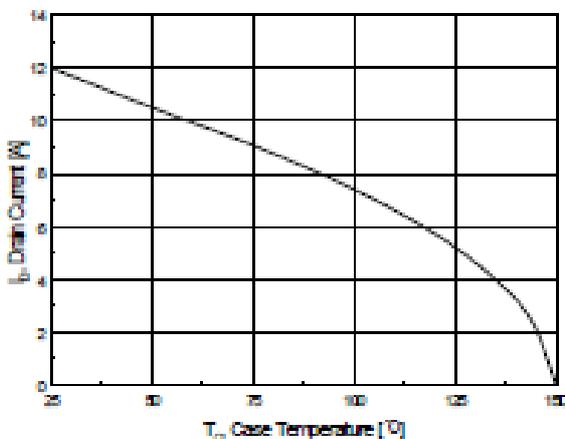
On-Resistance vs. Drain Current and Gate Voltage



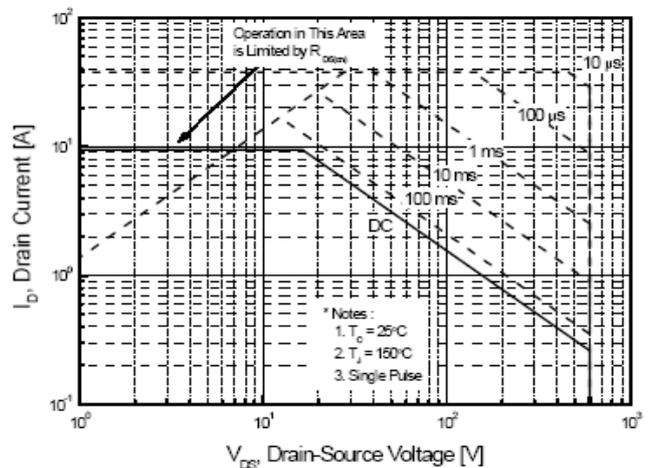
Normalized On-Resistance vs. Junction Temperature



Maximum Drain Current vs. Case Temperature

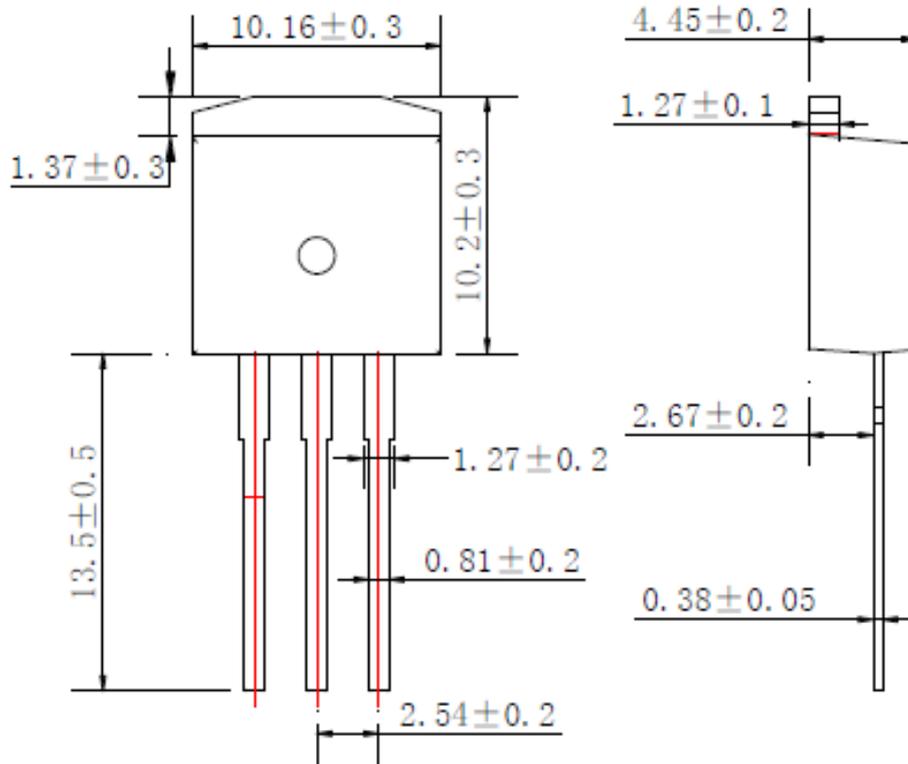


Maximum Safe Operating Area

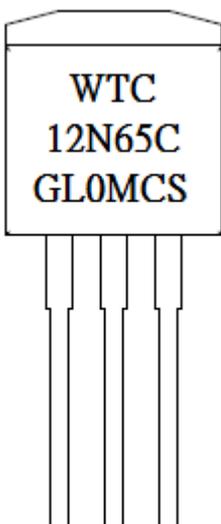


Outline Dimension : TO-262

Unit : mm



Marking Diagram



First Line	WTC	Company Name	
Second Line	12N65C	Product Code	
Third Line	GL0MCS	1st (Year Code)	A-2010 B-2011 C-2012 ...
		2nd (Month Code)	A-Jan B-Feb C-Mar D-Apr E-May F-Jun G-Jul H-Aug I-Sep J-Oct K- Nov L-Dec
		3rd (Lot Code)	0-1 , A-9
		4th (Product Code)	M-MOS , T-Transistor
		5th (Package Code)	C-TO-262 , I-TO-251 , F-TO220F
		6th (Spec Code)	Assembly Code