SEMICONDUCTOR
TECHNICAL DATA

WMR80N65C4

Description

super junction MOSFET family that is utilizing charge balance technology for extremely low on-resistance and low gate charge performance.

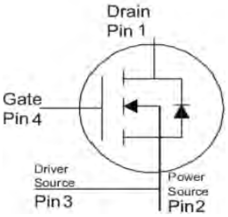
WMR80N65C4 is suitable for applications which require superior power density and outstanding efficiency.

TO-247-4

Features

- V_{DS} =700V @ $T_{j,max}$
- Typ. $R_{DS(on)}$ =0.033Ω
- 100% UIS tested
- Pb-free plating, Halogen free

RoHS compliant



Applications

LED Lighting, Charger, Adapter, PC, LCD TV, Server

Absolute Maximum Ratings

Parameter	Symbol	WMR80N65C4	Unit
Drain-source voltage	V_{DSS}	650	V
Continuous drain current[1] (T_C = 25°C)	I_D	80	A
(T_C = 100°C)		45	A
Pulsed drain current[2]	I_{DM}	245	A
Gate-source voltage	V_{GS}	±30	V
Avalanche energy, single pulse[3]	E_{AS}	850	mJ
Avalanche energy, repetitive[2]	E_{AR}	1.2	mJ
Avalanche current, repetitive[2]	I_{AR}	6	A
Power dissipation (T_C = 25°C)	P_D	410	W
- Derate above 25°C		3.28	W/°C
Operating and storage temperature range	T_j, T_{stg}	-55 to +150	°C
Continuous diode forward current	I_S	80	A
Diode pulse current	$I_{S,pulse}$	245	A

Thermal Characteristics

Parameter	Symbol	WMR80N65C4	Unit
Thermal resistance, junction-to-case	$R_{\theta JC}$	0.35	°C/W
Thermal resistance, junction-to-ambient	$R_{\theta\ A}$	62	°C/W

Electrical Characteristics $T_c = 25°C$, unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0 V, I_D=1 mA	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=0.25mA	2	3	4	V
Drain cut-off current	I_{DSS}	V_{DS}=650 V, V_{GS}=0V,				μA
		T_j = 25°C	-	-	10	
		T_j = 125°C	-	100	-	
Gate leakage current, forward	I_{GSSF}	V_{GS}=20V, V_{DS}=0V	-	-	300	nA
Gate leakage current, reverse	I_{GSSR}	V_{GS}=-20V, V_{DS}=0V	-	-	-300	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10 V, I_D=20A T_j = 25°C	- -	0.033	0.039	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	V_{DS}= 100V, V_{GS}= 0V, f = 1 MHz	-	6070	-	pF
Output capacitance	C_{oss}		-	220	-	
Reverse transfer capacitance	C_{rss}		-	3.5	-	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 300V, I_D = 30A R_G = 25Ω, V_{GS}=10V	-	64	-	ns
Rise time	t_r		-	69	-	
Turn-off delay time	$t_{d(off)}$		-	307	-	
Fall time	t_f		-	56	-	
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DD}=480V, I_D=30A, V_{GS}=0 to 10V	-	26.2	-	nC
Gate to drain charge	Q_{gd}		-	30.1	-	
Gate charge total	Q_g		-	103.0	-	
Gate plateau voltage	$V_{plateau}$		-	5.0	-	V
Reverse diode characteristics						
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=20A	-	-	1.2	V
Reverse recovery time	t_{rr}	V_R=50V, I_F=30A, dI_F/dt=100A/μs	-	375	-	ns
Reverse recovery charge	Q_{rr}		-	7.2	-	μC
Peak reverse recovery current	I_{rrm}		-	38	-	A

Notes:

1. Limited by $T_{j\,max}$. Maximum duty cycle D=0.5.
2. Repetitive rating: pulse width limited by maximum junction temperature.
3. I_{AS} = 6 A, V_{DD} = 50V, R_G = 25Ω, starting T_j = 25°C.

Typical Performance Characteristics

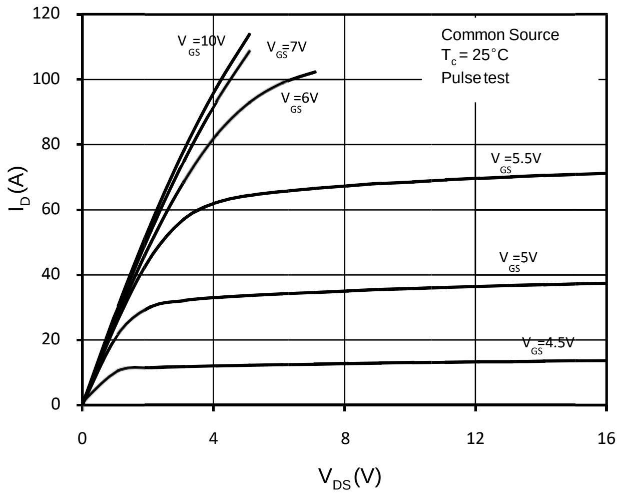


Figure 1. On-Region Characteristics

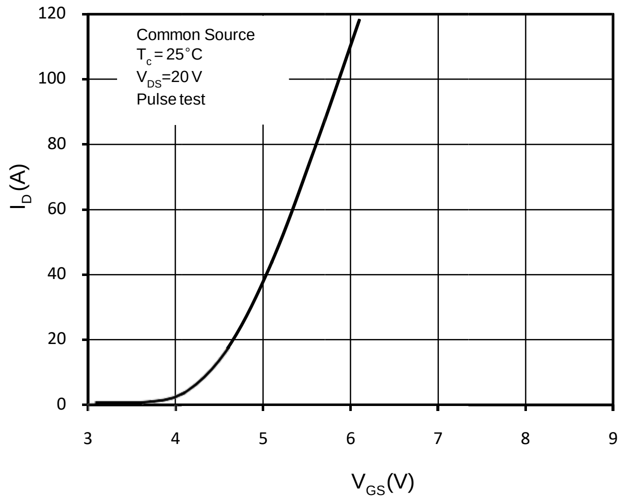


Figure 2. Transfer Characteristics

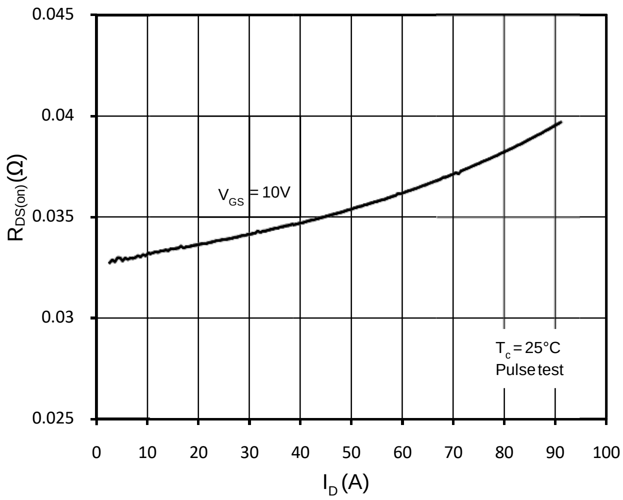


Figure 3. Static Drain-Source On Resistance

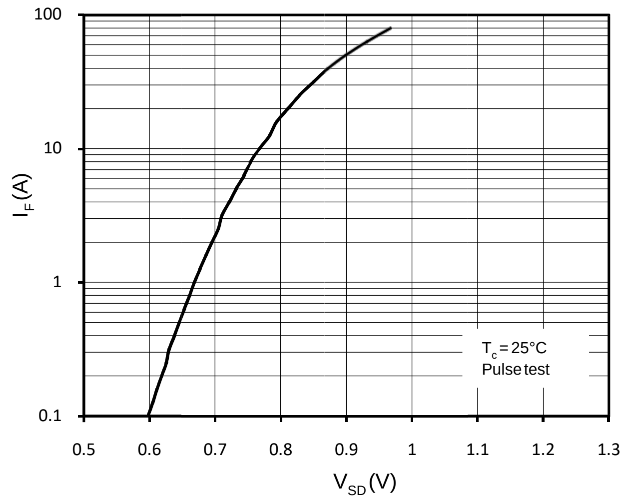


Figure 4. Body-Diode Forward Characteristics

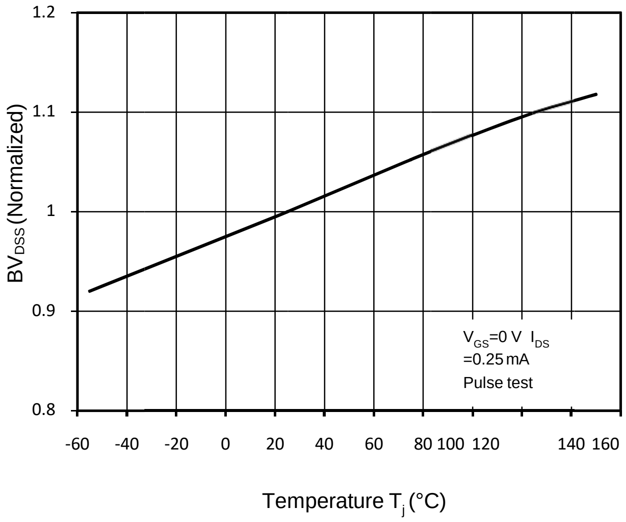


Figure 5. Normalized BV_{DSS} vs.Temperature

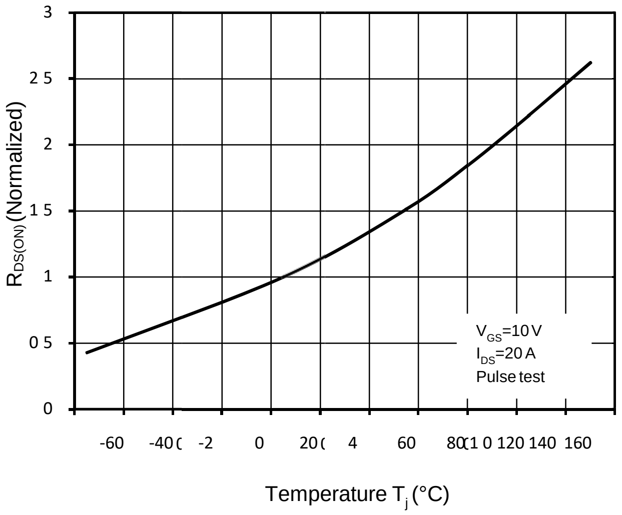


Figure 6. Normalized $R_{DS(on)}$ vs.Temperature

Typical Performance Characteristics(Con.)

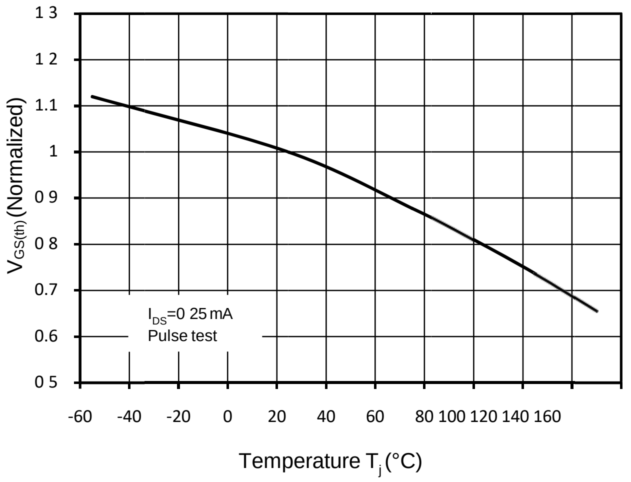


Figure 7. Threshold Voltage vs. Temperature

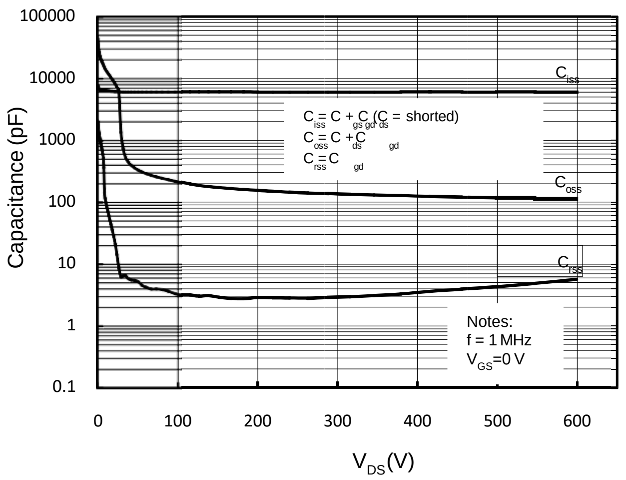


Figure 8. Capacitance Characteristics

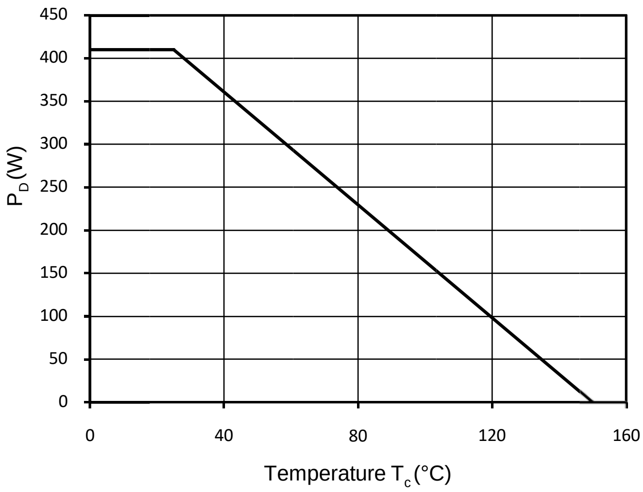


Figure 9. Power Dissipation

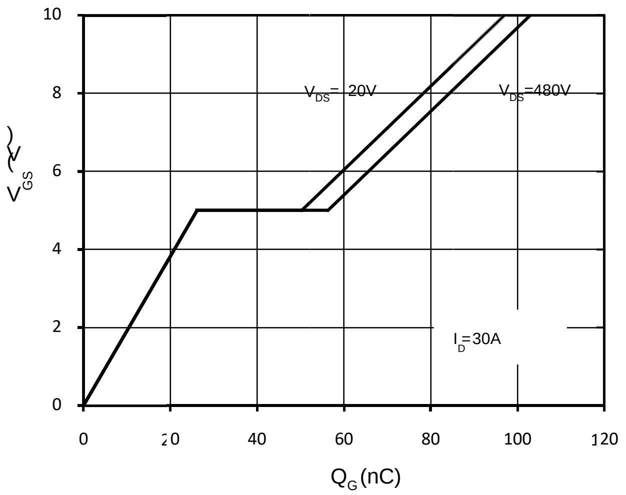


Figure 10. Gate Charge Characteristics

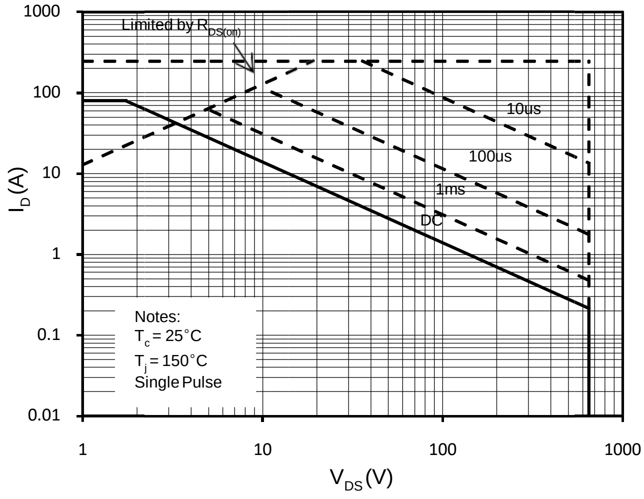


Figure 11. Maximum Safe Operating Area

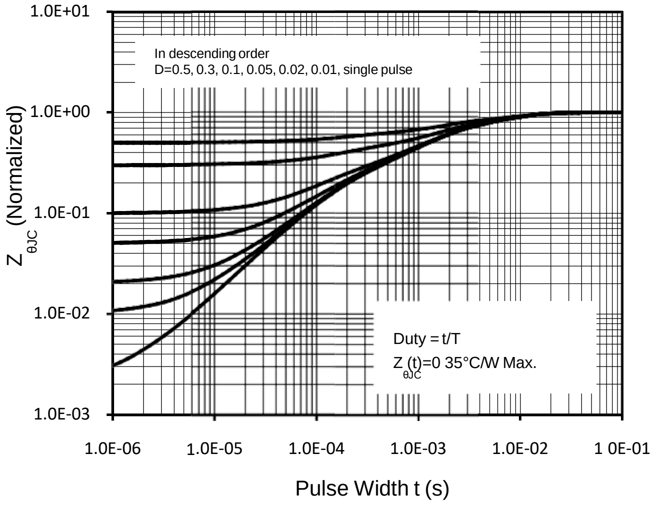
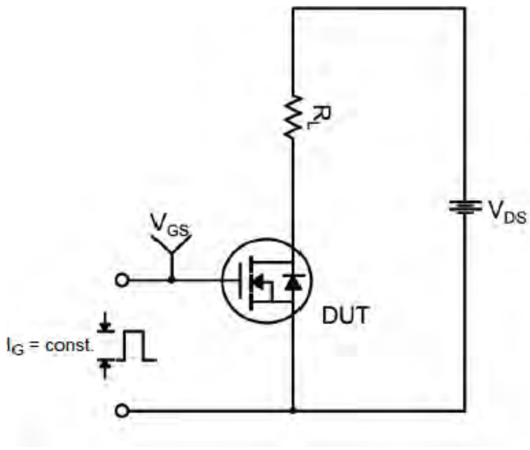
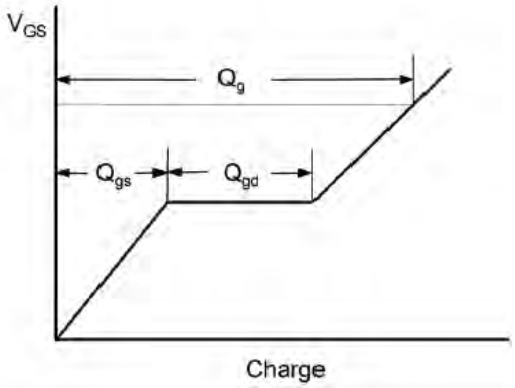


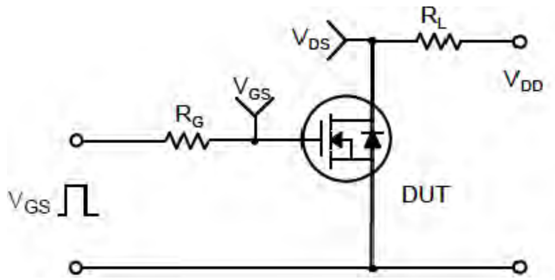
Figure 12. Transient Thermal Response Curve

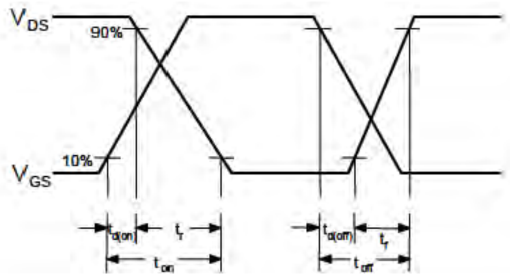
Gate Charge Test Circuit & Waveform



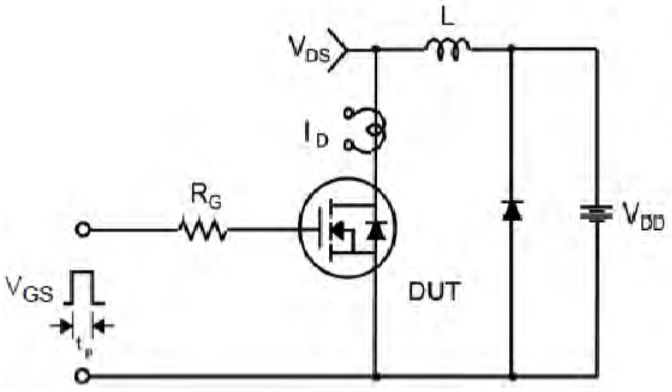


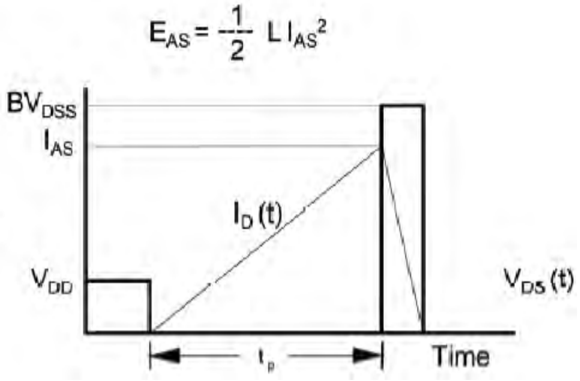
Switching Test Circuit & Waveforms



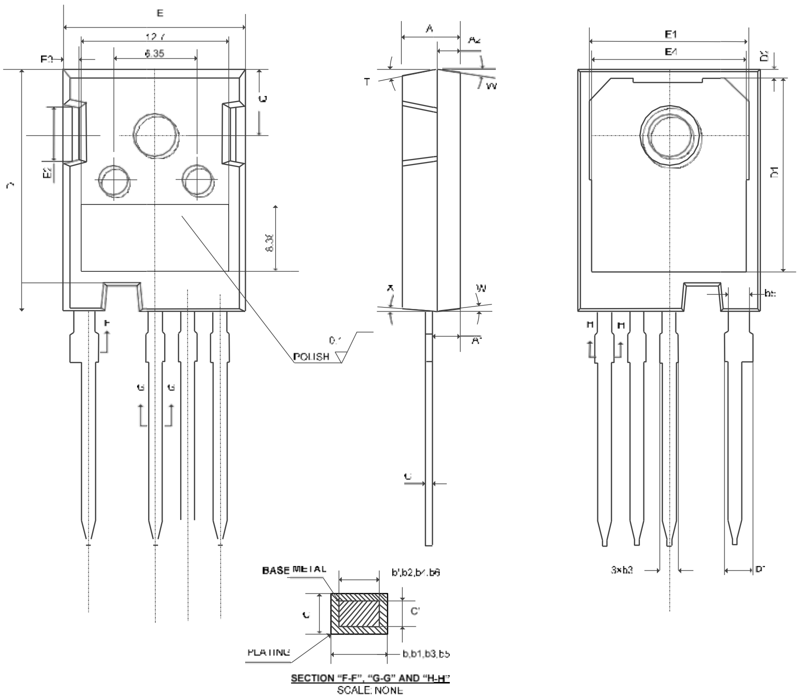


Unclamped Inductive Switching Test Circuit & Waveforms





Mechanical Dimensions for TO-247-4



COMMON DIMENSIONS

SYMBOL	mm	
	MIN	MAX
A	4.83	5.21
A1	2.29	2.54
A2	1.91	2.16
b'	1.07	1.28
b	1.07	1.33
b1	2.39	2.94
b2	2.39	2.84
b3	1.07	1.6
b4	1.07	1.5
b5	2.39	2.69
b6	2.39	2.64
c'	0.55	0.65
c	0.55	0.68
D	23.3	23.6
D1	16.25	17.65
D2	0.95	1.25
E	15.75	16.13
E1	13.1	14.15
E2	3.68	5.1
E3	1	1.9
E4	12.38	13.43
e	2.54 BSC	
e1	5.08BSC	
N	4	
L	17.31	17.82
L1	3.97	4.37
L2	2.35	2.65
Q	5.49	6
T	17.5° REF	
W	3.5° REF	
X	4°REF	