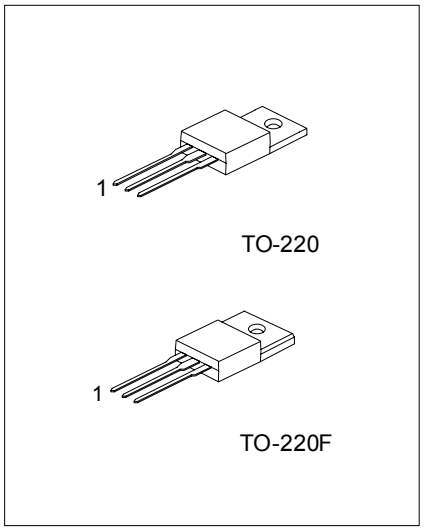
S10N65C

650V N-Channel MOSFET

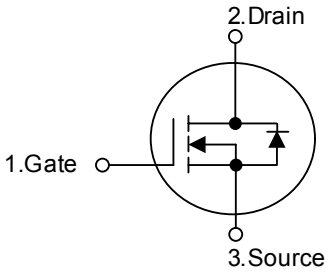


Description

The 10N65 is a high voltage MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in switching power supplies and adaptors.

Features

- 9.5A, 650V, $R_{DS(on)}$ = 0.75Ω @V_{GS} = 10 V
- Low gate charge (typical 36 nC)
- Low Crss (typical 5.8pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



Absolute Maximum Ratings

T_C = 25°C unless otherwise noted

QQ845200166

Symbol	Parameter	10N65	10N65F	Units
V_{DSS}	Drain-Source Voltage	650		V
I_D	Drain Current - Continuous (T_C = 25°C)	10	10 *	A
	- Continuous (T_C = 100°C)	6.5	6.5 *	A
I_{DM}	Drain Current - Pulsed (Note 1)	40	40 *	A
V_{GSS}	Gate-Source Voltage	±30		V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	758		mJ
I_{AR}	Avalanche Current (Note 1)	10		A
E_{AR}	Repetitive Avalanche Energy (Note 1)	19.8		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5		V/ns
P_D	Power Dissipation (T_C = 25°C)	198	52	W
	- Derate above 25°C	1.58	0.41	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150		°C
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300		°C

* Drain current limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	10N65	10N65F	Units
R_{JC}	Thermal Resistance, Junction-to-Case	0.63	2.4	°C/W
R_{CS}	Thermal Resistance, Case-to-Sink Typ.	0.5	--	°C/W
R_{JA}	Thermal Resistance, Junction-to-Ambient	62.5	62.5	°C/W

Electrical Characteristics

T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 A	650	--	--	V
BV_{DSS} / T_J	Breakdown Voltage Temperature Coefficient	I_D = 250 A, Referenced to 25°C	--	0.7	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 650 V, V_{GS} = 0 V	--	--	1	A
		V_{DS} = 480 V, T_C = 125°C	--	--	10	A
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 A	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 4.75 A	--	0.59	0.75	Ω
g_{FS}	Forward Transconductance	V_{DS} = 40 V, I_D = 4.75 A (Note 4)	--	9	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	1891	--	pF
C_{oss}	Output Capacitance		--	160	- -	pF
C_{rss}	Reverse Transfer Capacitance		--	5.8	- -	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 300 V, I_D = 9.5A, R_G = 25 (Note 4, 5)	--	55	--	ns
t_r	Turn-On Rise Time		--	39	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	156	--	ns
t_f	Turn-Off Fall Time		--	53	--	ns
Q_g	Total Gate Charge	V_{DS} = 480 V, I_D = 9.5A, V_{GS} = 10 V (Note 4, 5)	--	36	--	nC
Q_{gs}	Gate-Source Charge		--	8.3	--	nC
Q_{gd}	Gate-Drain Charge		--	8.3	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	10	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	40	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 9.5 A	--	--	1.5	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 9.5 A, dI_F / dt = 100 A/ s (Note 4)	--	344	--	ns
Q_{rr}	Reverse Recovery Charge		--	3.6	--	µC

Notes:
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 14.2mH, I_{AS} = 9.5 A, V_{DD} = 50V, R_G = 25 Ω Starting T_J = 25°C
3. I_{SD} ≤ 9.5A, di/dt ≤ 200A/ s, V_{DD} ≤ $BV_{DSS,}$ Starting T_J = 25°C
4. Pulse Test : Pulse width ≤ 300µs, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

Typical Characteristics

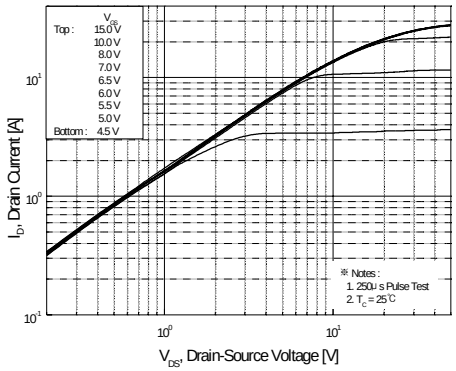


Figure 1. On-Region Characteristics

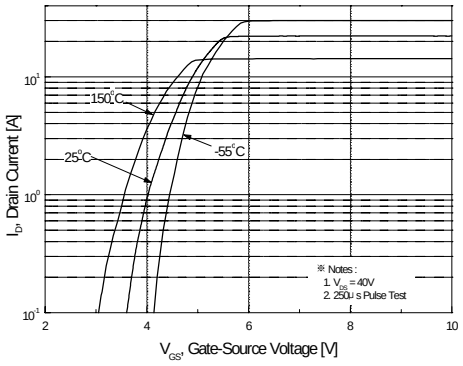


Figure 2. Transfer Characteristics

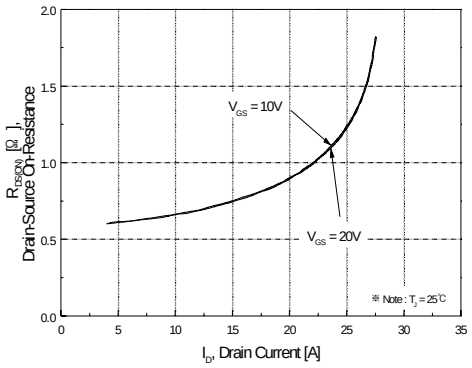


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

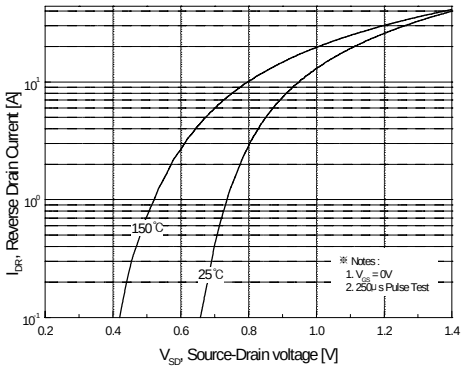


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

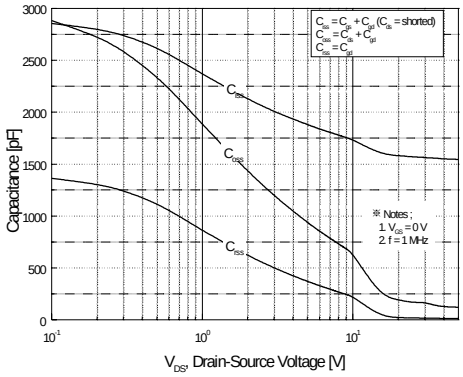


Figure 5. Capacitance Characteristics

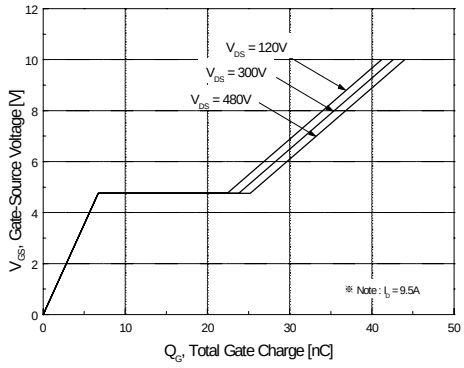


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

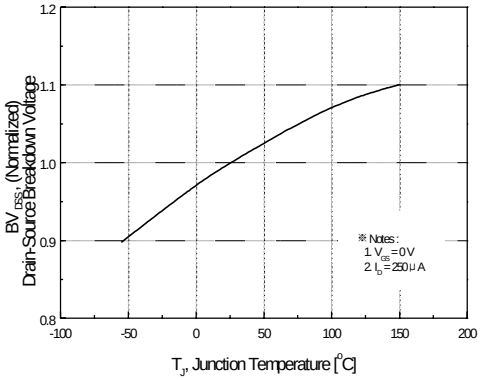


Figure 7. Breakdown Voltage Variation vs Temperature

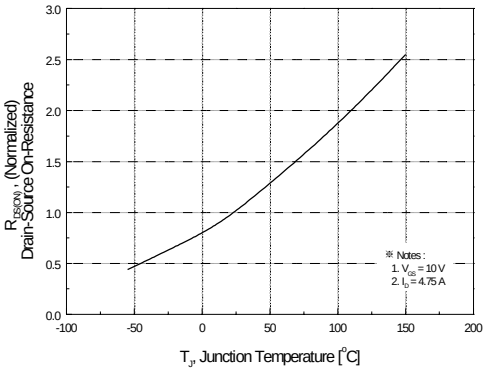


Figure 8. On-Resistance Variation vs Temperature

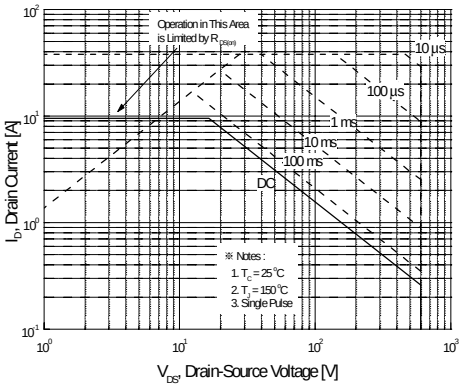


Figure 9-1. Maximum Safe Operating Area for 10N65

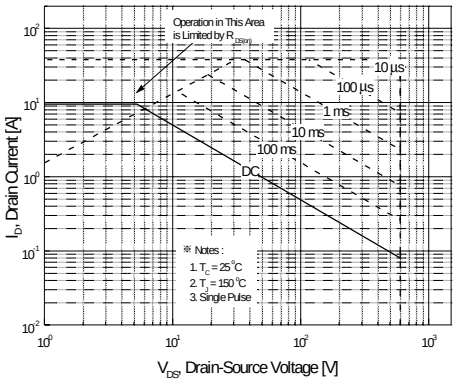


Figure 9-2. Maximum Safe Operating Area for 10N65F

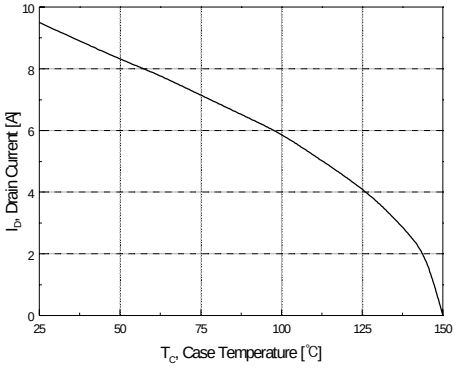


Figure 10. Maximum Drain Current vs Case Temperature

Typical Characteristics (Continued)

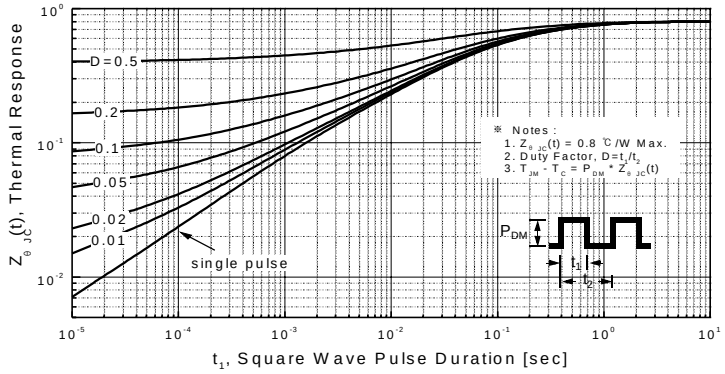


Figure 11-1. Transient Thermal Response Curve for 10N65

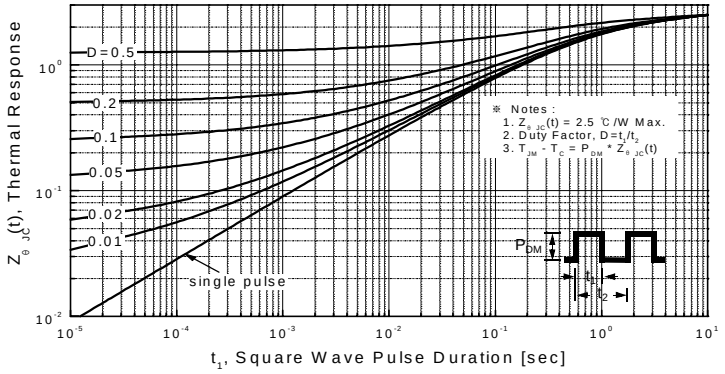


Figure 11-2. Transient Thermal Response Curve for 10N65F