

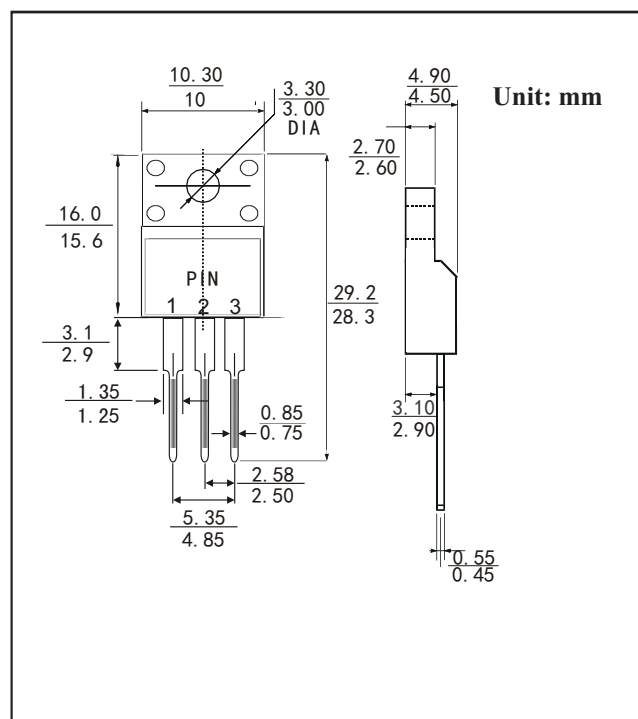
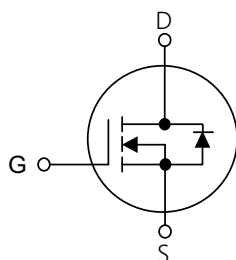
TO-220F 20A, 650V N-CHANNEL POWER MOSFET
FEATURES

- $R_{DS(ON)} < 0.5\Omega @ V_{GS}=10V$
- Fast switching capability
- Low Gate Charge
- Lead free in compliance with EU RoHS directive.

SYMBOL

Pin Definition:

1. Gate
2. Drain
3. Source

Block Diagram


ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise specified)			
PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	V _{DS}	650	V
Gate-Source Voltage	V _{GS}	±30	V
Continuous Drain Current	I _D	20	A
Pulsed Drain Current (Note 1)	I _{DM}	80	A
Avalanche Energy(Note 5)	E _{AS}	550	mJ
Power Dissipation	TO-220/TO-3P	250	W
	ITO-220/ITO-220-L	80	
Junction Temperature	T _J	+150	°C
Storage Temperature	T _{STG}	-55 ~ +150	°C

THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220	$R_{\theta JA}$	62.5	$^{\circ}\text{C/W}$
	ITO-220/ITO-220-L			
	TO-3P		41.7	
Junction to Case	TO-220/TO-3P	$R_{\theta JC}$	0.5	$^{\circ}\text{C/W}$
	ITO-220/ITO-220-L		1.47	

ELECTRICAL CHARACTERISTICS ($T_C=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V,I _D =250μA	650			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =650V,V _{GS} =0V			1	μA
Gate- Source Leakage Current	Forward	I _{GSS}	V _{GS} =30V,V _{DS} =0V			100	nA
	Reverse		V _{GS} =-30V,V _{DS} =0V			-100	nA
ON CHARACTERISTICS(Note 3)							
Gate Threshold Voltage		V _{GS (TH)}	V _{DS} =V _{GS} ,I _D =250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V,I _D =10A			0.5	Ω
DYNAMIC CHARACTERISTICS(Note 4)							
Input Capacitance		C _{ISS}	V _{DS} =25V,V _{GS} =0V,f=1MHz		2400		pF
Output Capacitance		C _{OSS}			225		pF
Reverse Transfer Capacitance		C _{RSS}			20		pF
SWITCHING CHARACTERISTICS (Note 4)							
Turn-On Delay Time		t _{D(ON)}	V _{DD} =325V,I _D =20A, R _G =25Ω		35		ns
Turn-On Rise Time		t _r			82		ns
Turn-Off Delay Time		t _{D(OFF)}			180		ns
Turn-Off Fall Time		t _f			90		ns
Total Gate Charge		Q _G	V _{DS} =325V,I _D =20A, V _{GS} =10V		65		nC
Gate-Source Charge		Q _{GS}			11		nC
Gate-Drain Charge		Q _{GD}			26		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V,I _S =20A			1.5	V
Maximum Continuous Drain-Source Diode Forward Current (Note 2)		I _S				20	A
Reverse Recovery Time		t _{rr}	V _{GS} =0V,I _S =20A		390		ns
Reverse Recovery Charge		Q _{RR}	di _F /dt=100A/μs(Note 1)		3400		nC

Note:1. Repetitive Rating : Pulse width limited by maximum junction temperature

2. Surface mounted on FR4 Board , $t_s \leq 10\text{sec}$

3. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

4. Guaranteed by design, not subject to production.

5. $L=10\text{mH}$, $I_D=10.5A$, $V_{DD}=50V$, $V_{GATE}=650V$, Starting $T_J=25^{\circ}\text{C}$

Typical characteristics Diagrams

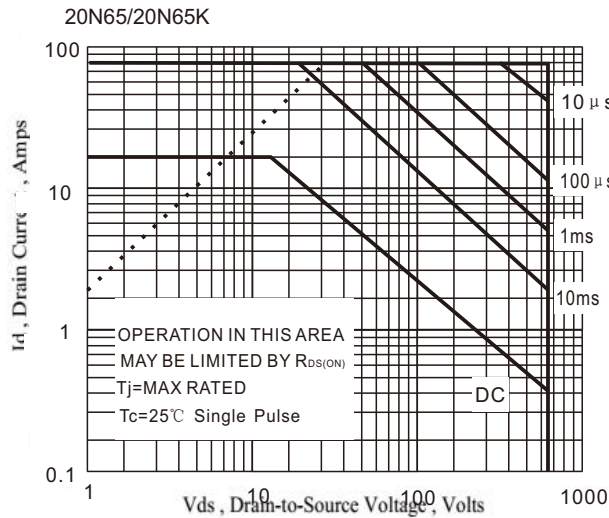


Figure 1 Maximum Forward Bias Safe Operating Area

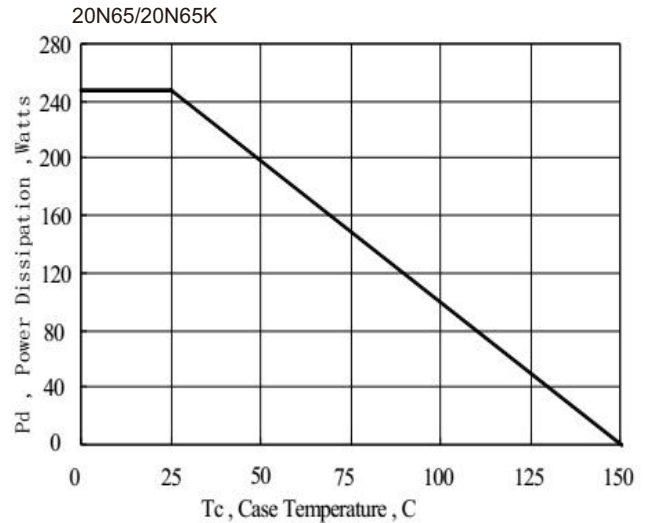


Figure 2 Maximum Power Dissipation vs Case Temperature

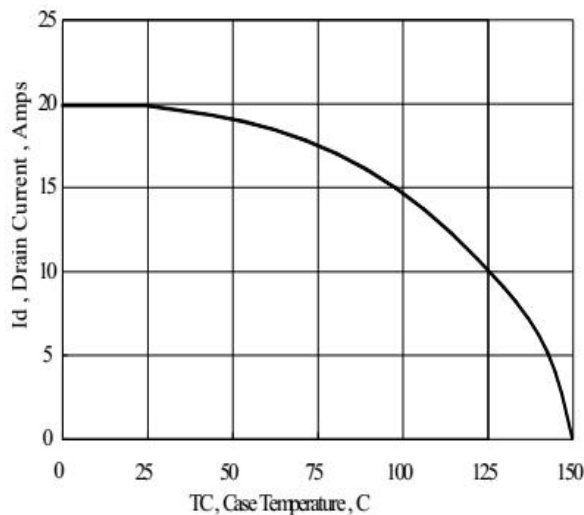


Figure 3 Maximum Continuous Drain Current vs Case Temperature

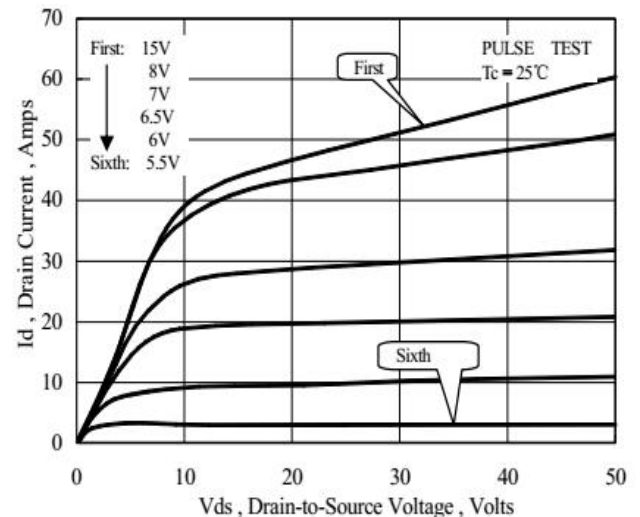


Figure 4 Typical Output Characteristics

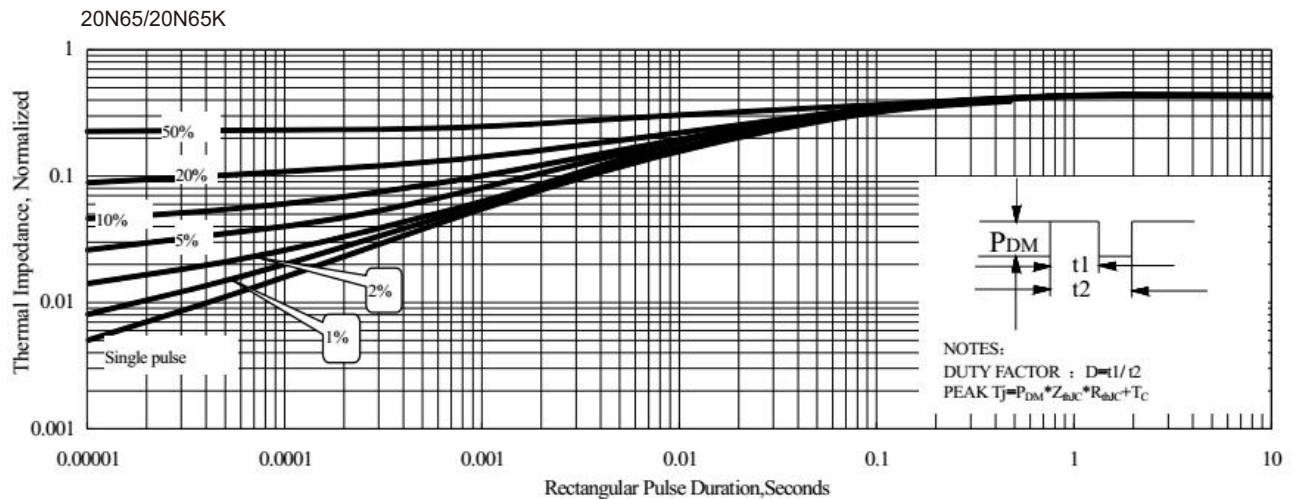


Figure 5 Maximum Effective Thermal Impedance, Junction to Case

Typical characteristics Diagrams

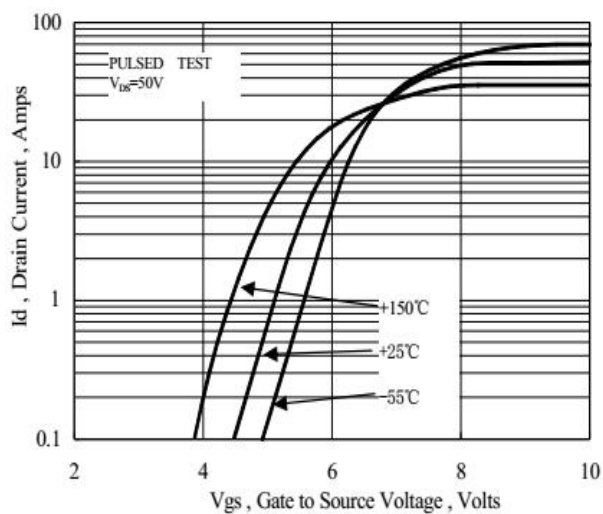


Figure 6 Typical Transfer Characteristics

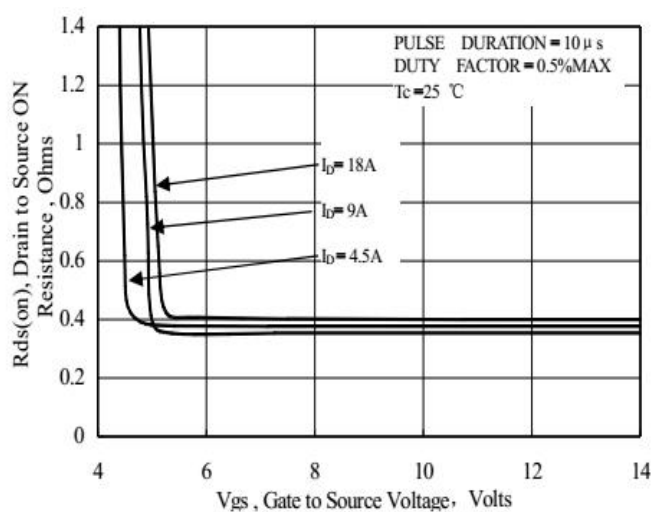


Figure 7 Typical Drain to Source ON Resistance vs Gate Voltage and Drain Current

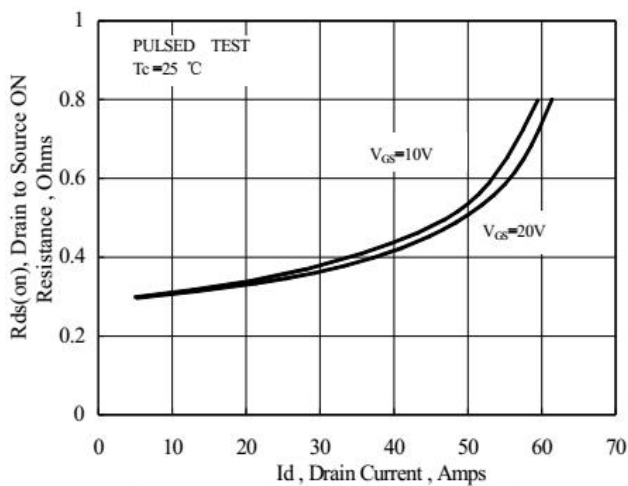


Figure 8 Typical Drain to Source ON Resistance vs Drain Current

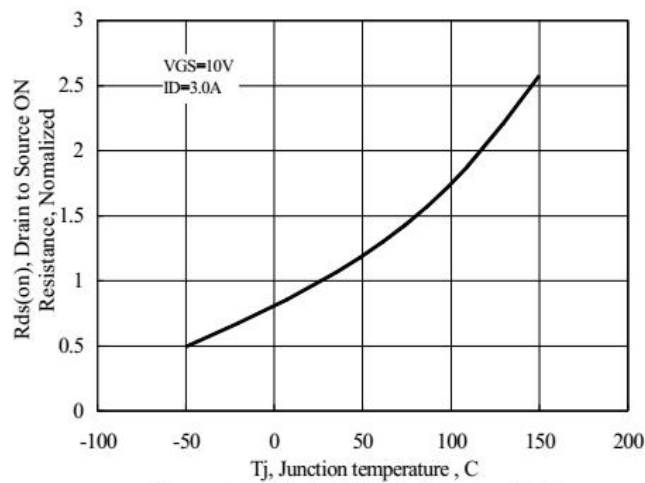


Figure 9 Typical Drain to Source on Resistance vs Junction Temperature

Typical characteristics Diagrams

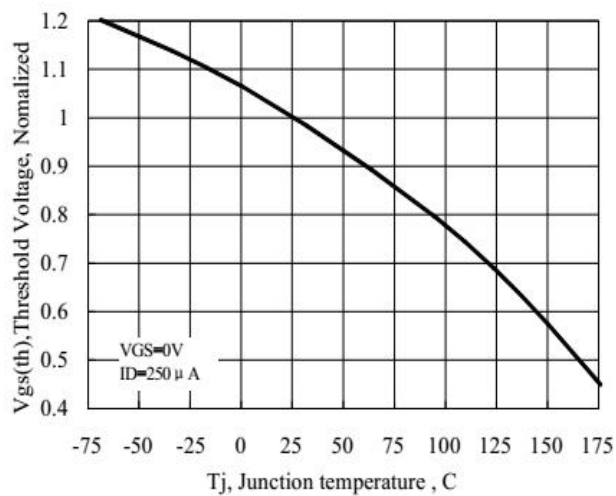


Figure 10 Typical Theshold Voltage vs Junction Temperature

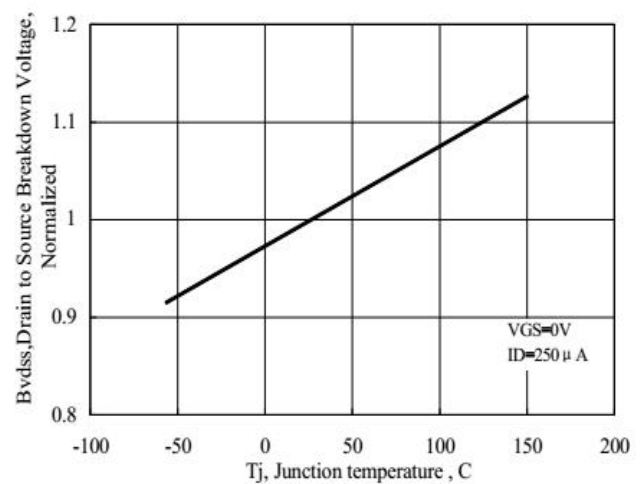


Figure 11 Typical Breakdown Voltage vs Junction Temperature

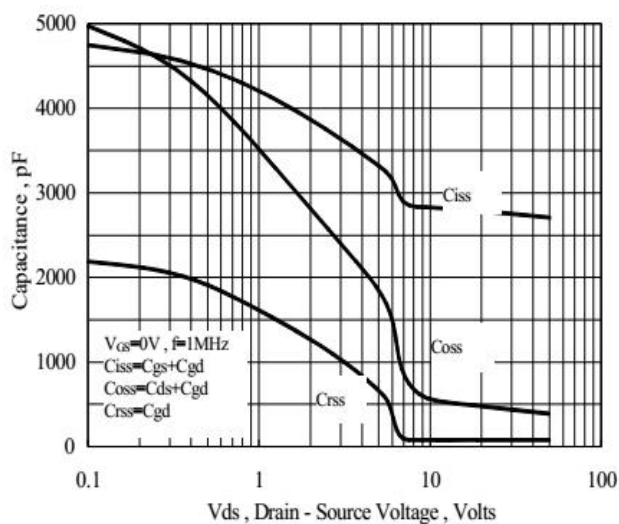


Figure 12 Typical Capacitance vs Drain to Source Voltage

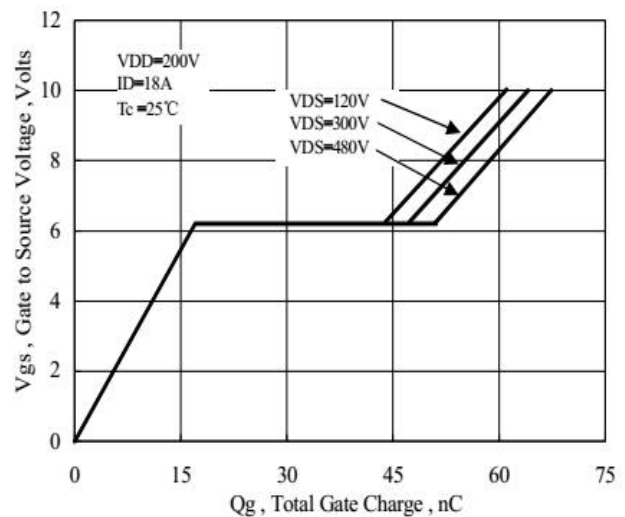


Figure 13 Typical Gate Charge vs Gate to Source Voltage

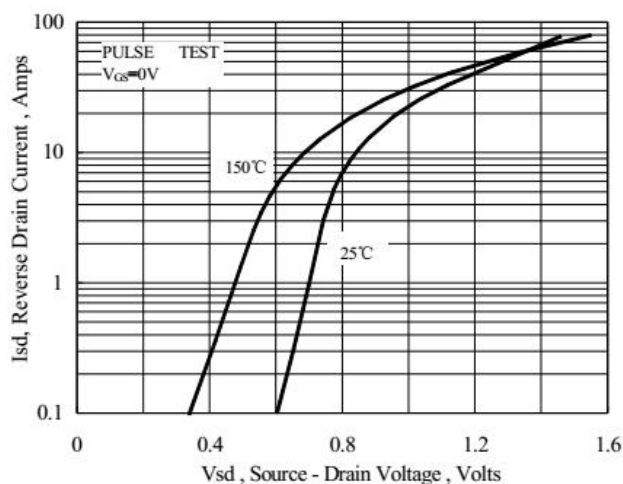


Figure 14 Typical Body Diode Transfer Characteristics

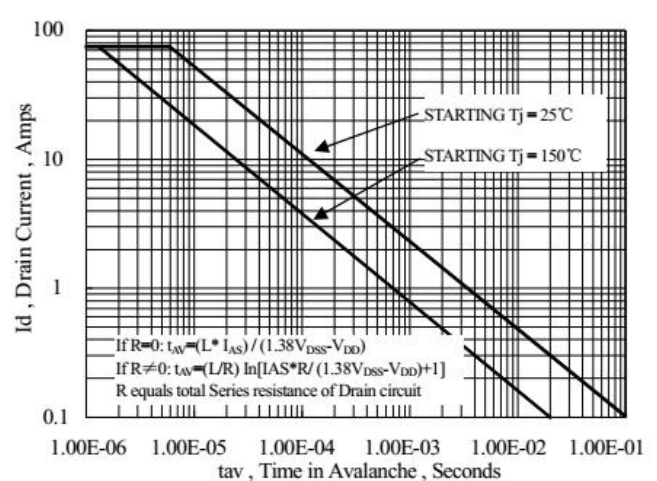


Figure 15 Unclamped Inductive Switching Capability

Typical characteristics Diagrams

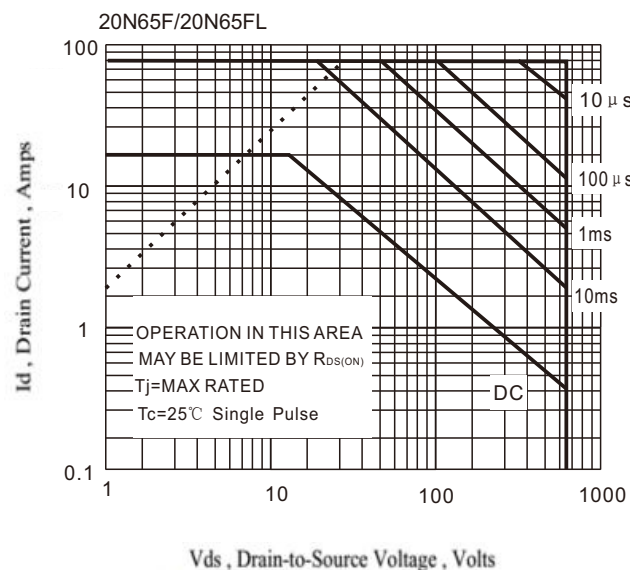


Figure 16 Maximum Forward Bias Safe Operating Area

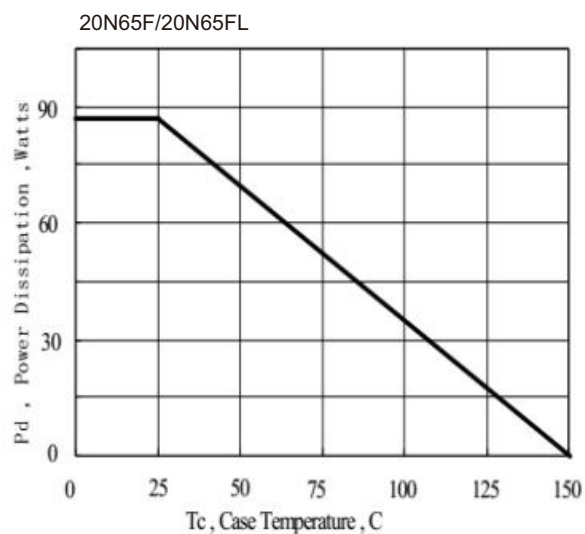


Figure 17 Maximum Power Dissipation vs Case Temperature

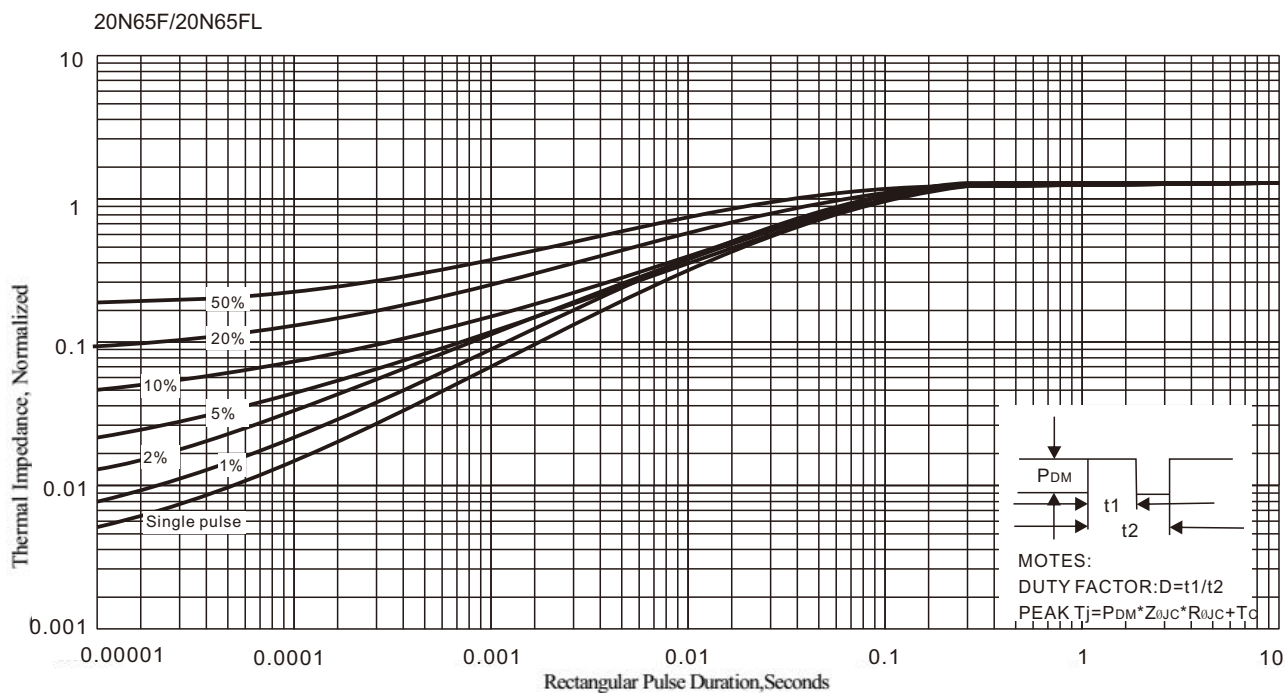


Figure 17 Maximum Effective Thermal Impedance , Junction to Case