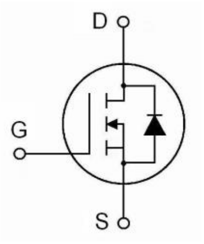
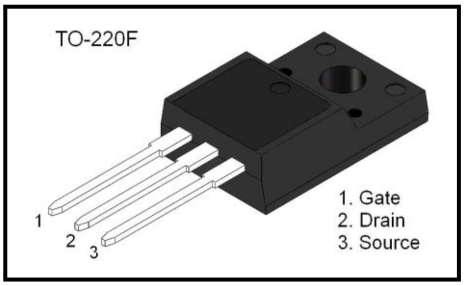
General Description

The 15N65F is a high voltage power MOSFET designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristic. This power MOSFET is usually used in high speed switching applications including power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits

Features

- V_{DS} 650V
- I_D 15A
- $R_{DS(ON)}$ (V_{GS} = 10V) <0.65Ω
- Fast Switching Capability
- Avalanche Energy Specified
- Improved dv/dt Capability, High Ruggedness





Absolute Maximum Ratings (T_A = 25℃)

Parameter		Symbol	Ratings	Units
Gate-Drain Voltage		V_{DSS}	650	V
Gate-Source Voltage		V_{GSS}	±30	V
Continuous Drain Current (Note 2)	T_C=25 °C	I_D	15	A
	Pulsed	I_{DM}	60	
Power Dissipation		P_D	60	W
Avalanche Energy	Single Pulsed (Note 4)	E_{AS}	637	mJ
	Repetitive (Note 5)	E_{AR}	25	mJ
Peak Diode Recovery dv/dt (Note 5)		dv/dt	4.5	V/ns
Junction Temperature		T_j	150	°C
Storage Temperature		T_{stg}	-55～150	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. Drain current limited by maximum junction temperature
3. Repetitive Rating: Pulse width limited by maximum junction temperature
4. L = 5.2mH, I_{AS} = 15A, V_{DD} = 50V, R_G= 25Ω Starting T_j = 25°C
5. I_{SD} ≤15A, di/dt≤200A/μs, V_{DD}≤BV_{DSS}, Starting T_j = 25°C

Thermal Characteristic

Parameter	Symbol	Value	Units
Maximum Thermal Resistance, Junction-case	$R_{\theta JC}$	3.3	°C/W
Maximum Thermal Resistance, Junction-Ambient	$R_{\theta JA}$	62.5	°C/W

Electrical Characteristics ($T_j = 25^{\circ}C$ unless otherwise specified)

Parameter		Symbol	Test Conditions	Min.	Typ	Max.	Units
Off Characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V,I_D=-250μA	650			V
Breakdown Voltage Temperature Coefficient		$\Delta BV_{DSS}/\Delta T_J$	I_D = 250μA, Referenced to 25 ℃		0.7		V/ ℃
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS}= 650V, V_{GS}= 0V			1	μA
Gate Leakage Current	Forward	I_{GSS}	V_{DS}=0V,V_{GS}=30V			100	nA
	Reverse		V_{DS}=0V,V_{GS}=-30V			-100	nA
On Characteristics							
Gate Threshold Voltage		$V_{GS(th)}$	V_{DS}=V_{GS},I_D=-250μA	2.0		4.0	V
Drain-source On-Resistance		$R_{DS(ON)}$	V_{GS} = 10V,I_D = 7.5A		0.5	0.65	Ω
Dynamic Characteristics							
Input Capacitance		Ciss	V_{DS} = 25V,V_{GS} = 0V, f = 1.0MHz		2380		pF
Output Capacitance		Coss			295		
Reverse Transfer Capacitance		Crss			23.6		
Switching Characteristics)							
Turn-On Delay Time		$t_{d(on)}$	V_{DS} = 325V, I_D = 15A R_G = 21.7Ω (Note1, 2)		65		ns
Turn-on Rise Time		t_r			125		
Turn-Off elay Time		$t_{d(off)}$			105		
Turn-Off Fall		t_f			65		
Total Gate Charge		Q_g	V_{DS} = 520V, I_D = 15A V_{GS} = 10V (Note1, 2)		48.5		nC
Gate-Source Charge		Q_{gs}			14		
Gate-Drain Charge		Q_{gd}			21.2		
Drain-Source Diode Characteristics							
Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_S =15A			1.4	V
Diode Forward Current		I_S	-			15	A
Pulsed Diode Forward Current		I_{SM}				60	A
Reverse Recovery Time		t_{rr}	I_S = 15A, V_{GS} = 0V dI_F/dt =100A/μs (Note 1)		496		ns
Reverse Recovery Charge		Q_{rr}			5.7		nC

Notes: 1. Pulse Test : Pulse width ≤300μs, Duty cycle ≤2%

2. Essentially independent of operating temperature

Test Circuits and Waveforms

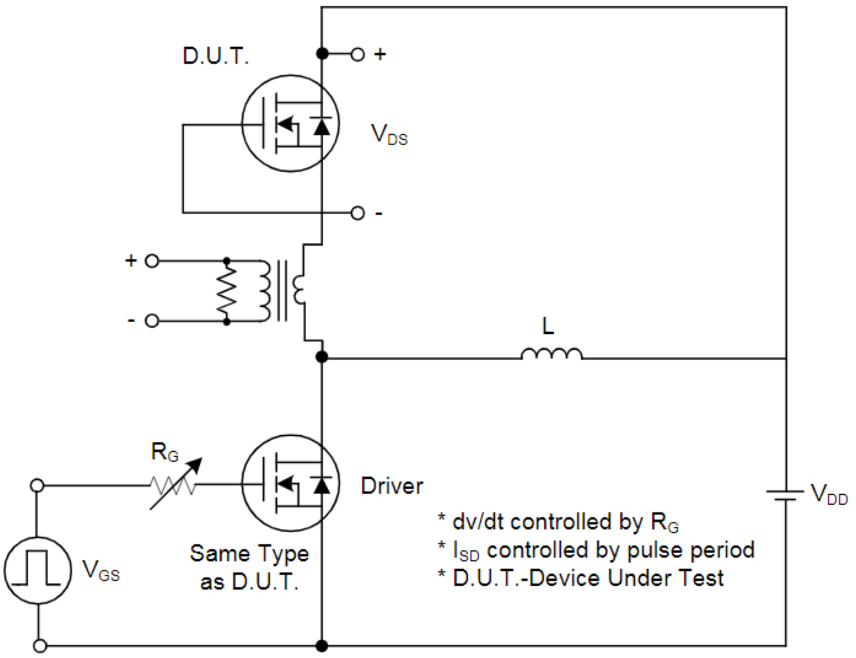


Figure 1. Peak Diode Recovery dv/dt Test Circuit

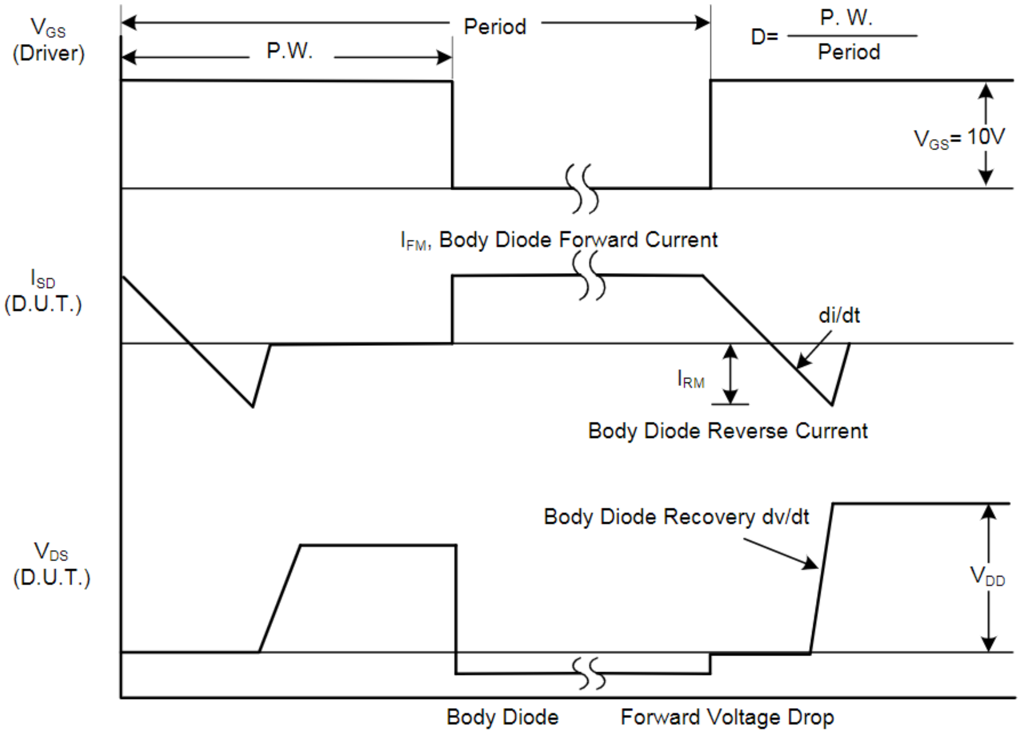


Figure 2. Peak Diode Recovery dv/dt Waveforms

Test Circuits and Waveforms

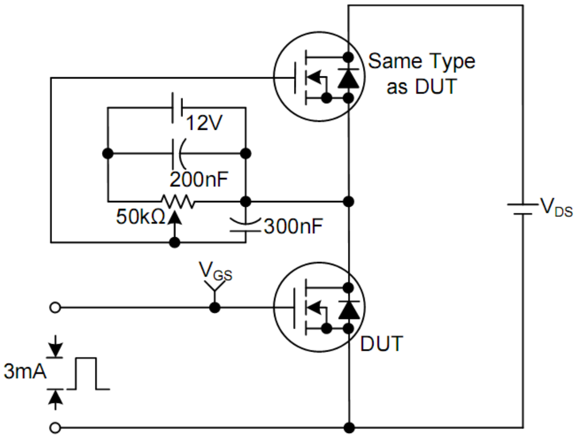


Figure 3. Gate Charge Test Circuit

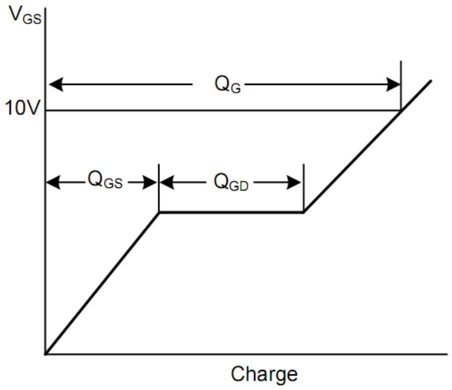


Figure 4. Gate Charge Waveforms

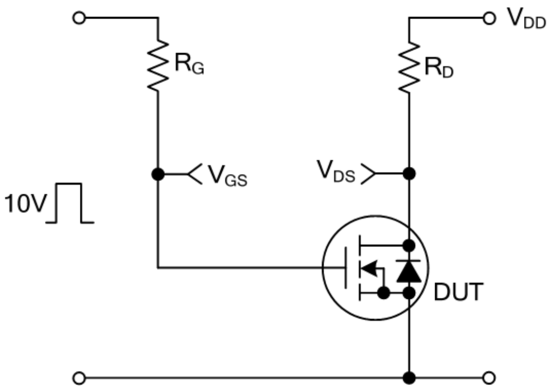


Figure 5. Resistive Switching Circuit

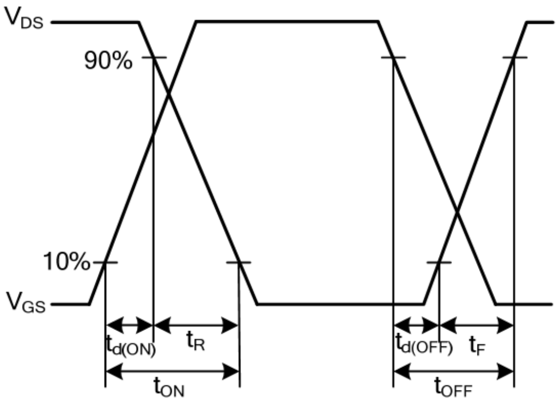


Figure 7. Resistive Switching Waveforms

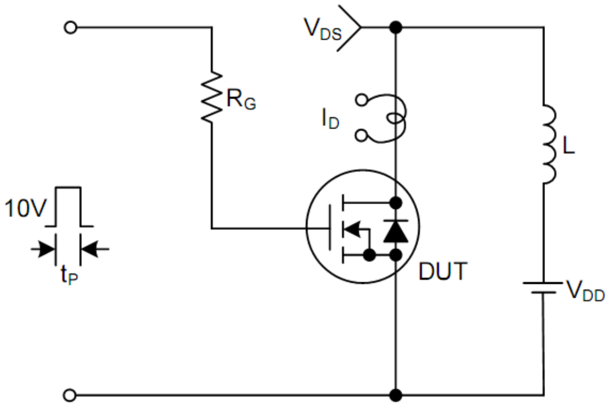


Figure 7. Unclamped Inductive Switching Test Circuit

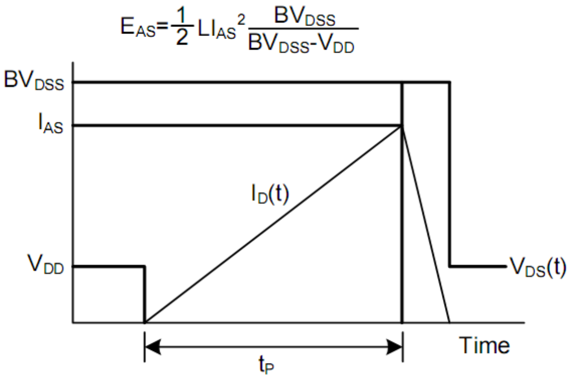


Figure 8. Unclamped Inductive Switching Waveforms

Typical Characteristics

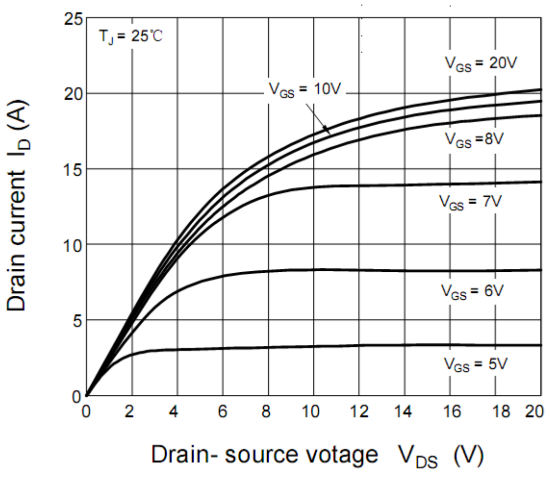


Figure 9 Output Characteristics

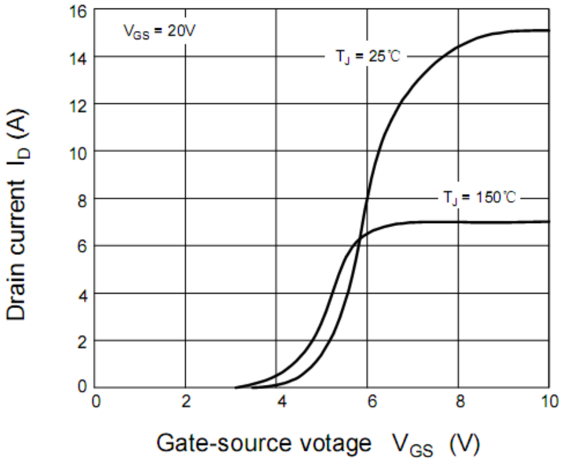


Figure 10. Transfer Characteristics

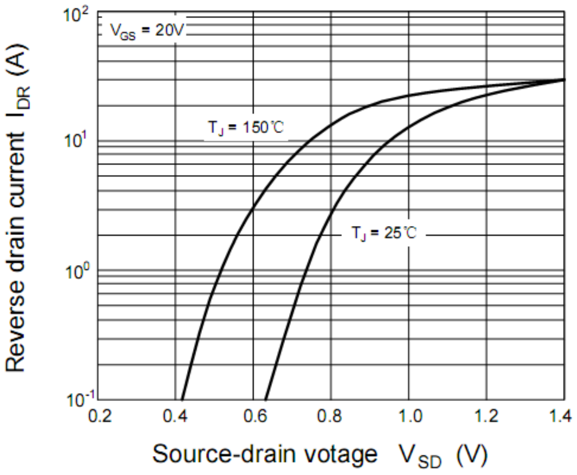


Figure 11. Body Diode Forward Voltage vs. Source current

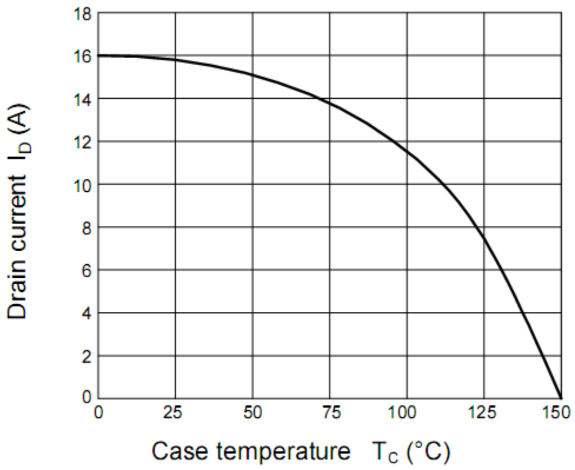


Figure 12. Drain current vs. Temperature

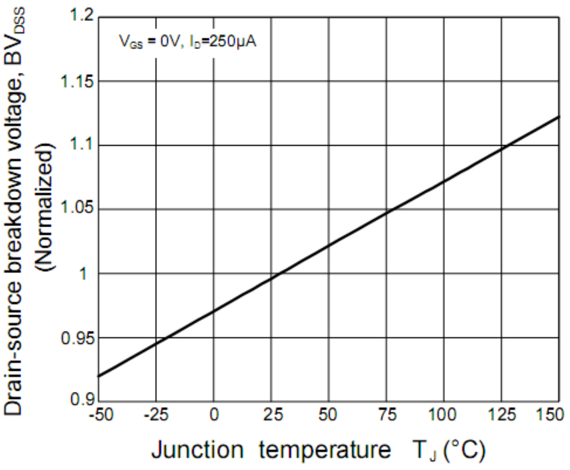


Figure 13. Breakdown Voltage Variation vs. temperature

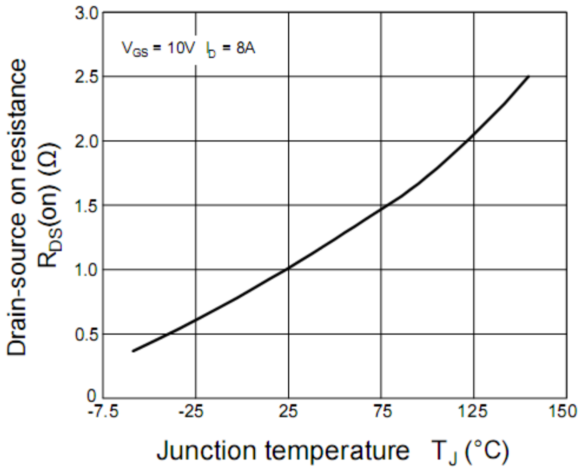


Figure 14. On-Resistance vs. Temperature

Typical Characteristics

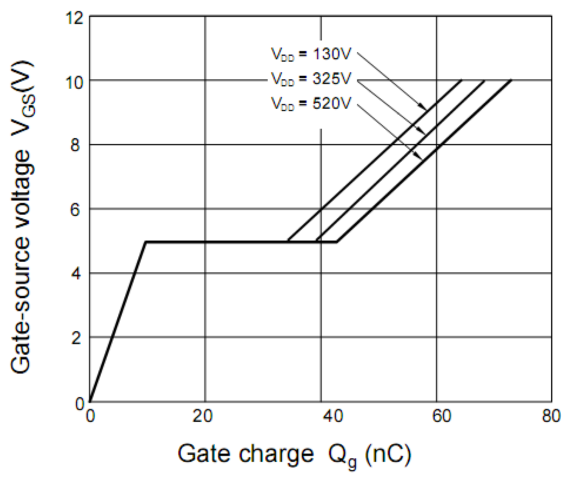


Figure 15. Typical Drain to Source ON Resistance vs Drain Current

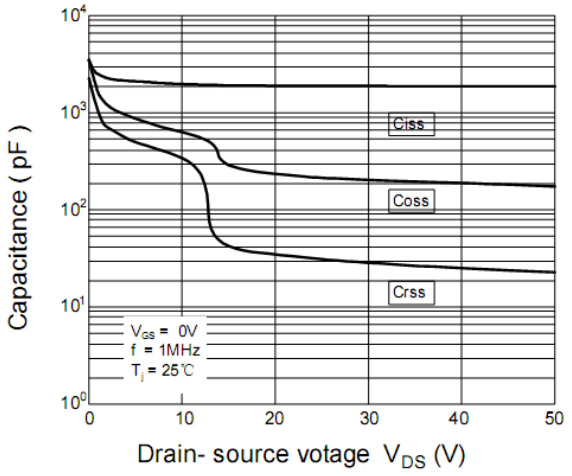


Figure 16. Capacitance vs Drain to Source Voltage

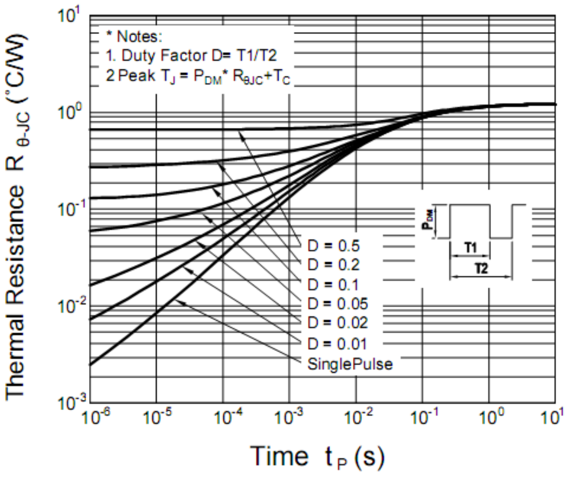


Figure 17. Transient Thermal Impedance

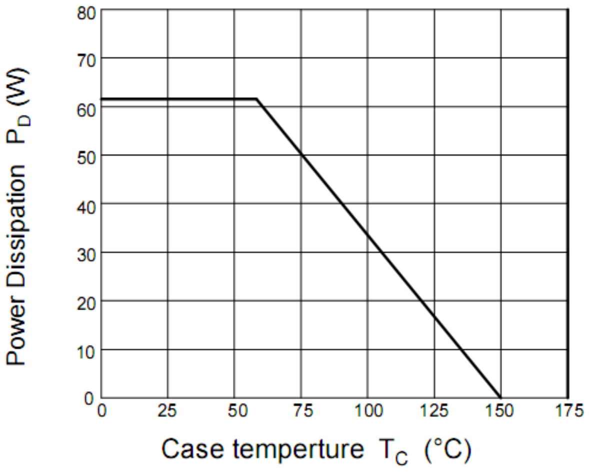
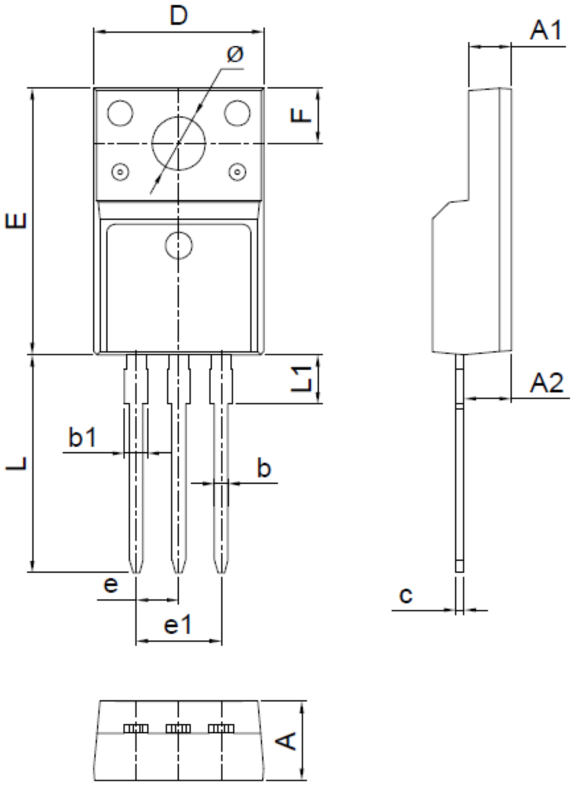


Figure 18. Power Derating

Package Dimensions



Dim	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.50	4.90	0.177	0.193
A1	2.34	2.74	0.092	0.108
A2	2.66	2.86	0.105	0.113
b	0.75	0.85	0.030	0.033
b1	1.24	1.44	0.049	0.057
c	0.40	0.60	0.016	0.024
D	10.00	10.32	0.394	0.406
E	15.75	16.05	0.620	0.632
e	2.44	2.64	0.096	0.104
e1	4.88	5.28	0.192	0.208
F	3.10	3.5	0.122	0.138
L	12.90	13.50	0.508	0.531
L1	2.90	3.30	0.114	0.130
Φ	3.10	3.30	0.122	0.130