ATM7N65ATE

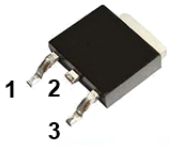
N-Channel Enhancement Mode Field Effect Transistor

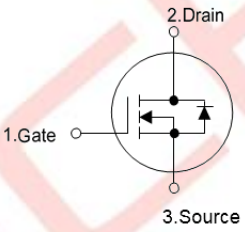
Drain-Source Voltage: 650V ***Drain Current: 8A***

DESCRIPTION

The ATM7N65ATE is a high voltage and high current power MOSFET designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and high rugged avalanche characteristics. This power MOSFET is usually used in high speed switching applications at power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

TO-252





FEATURES

- $R_{DS(ON)}$ < 1.4Ω@V_{GS} = 10 V
- Fast switching capability
- Avalanche energy specified
- Improved dv/dt capability, high ruggedness

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	650	V
Gate-Source Voltage		V_{GSS}	±30	V
Avalanche Current (Note 2)		I_{AR}	8	A
Drain Current	Continuous	I_D	8	A
	Pulsed (Note 2)	I_{DM}	32	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	230	mJ
	Repetitive (Note 2)	E_{AR}	14.7	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-252	P_D	48	W
Junction Temperature		T_J	+150	°C
Operating Temperature		T_{OPR}	-55 ~ +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. Repetitive Rating : Pulse width limited by T_J
3. L=7.1mH, I_{AS}=8A, V_{DD}= 50V, R_G=25Ω, Starting T_J=25°C
4. I_{SD} ≤8A, di/dt ≤200A/μs, V_{DD} ≤BV_{DSS}, Starting T_J=25°C

ATM7N65ATE

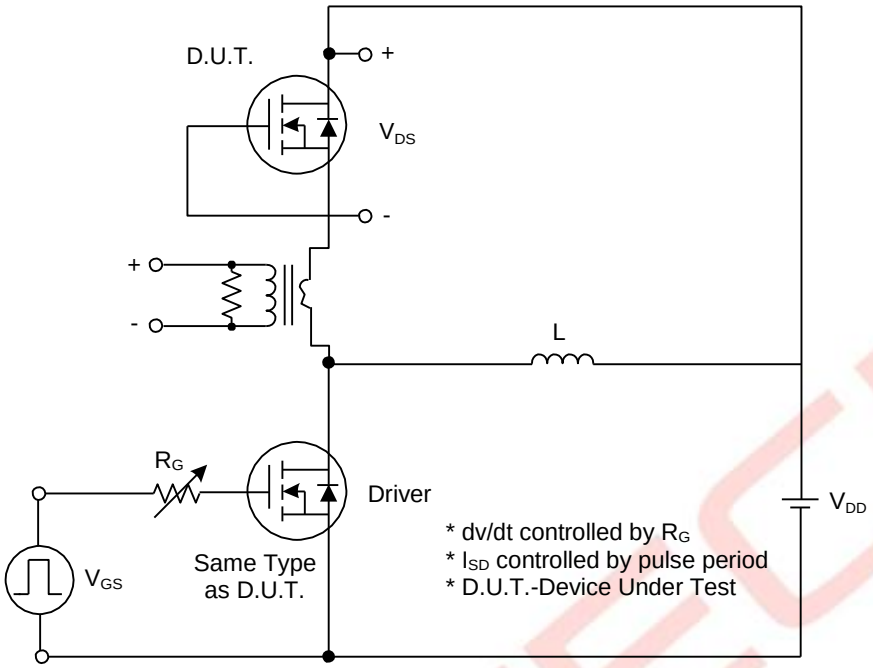
ELECTRICAL CHARACTERISTICS (T_C =25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS} = 0 V, I_D = 250 μA	650			V
Drain-Source Leakage Current		I_{DSS}	V_{DS} = 650 V, V_{GS} = 0 V			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS} = 30 V, V_{DS} = 0 V			100	nA
	Reverse		V_{GS} = -30 V, V_{DS} = 0 V			-100	nA
Breakdown Voltage Temperature Coefficient		$\triangle BV_{DSS}/\triangle T_J$	I_D =250μA,Referenced to 25°C		0.7		V/°C
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS} = V_{GS}, I_D = 250 μA	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS} = 10 V, I_D = 4A		1.2	1.4	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{DS} = 25 V, V_{GS} = 0V, f = 1MHz		1145	1255	pF
Output Capacitance		C_{OSS}			118	135	pF
Reverse Transfer Capacitance		C_{RSS}			19	25	pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		$t_{D(ON)}$	V_{DD} = 325V, I_D =8A, R_G = 25Ω (Note 1, 2)		84	100	ns
Turn-On Rise Time		t_R			100	130	ns
Turn-Off Delay Time		$t_{D(OFF)}$			275	320	ns
Turn-Off Fall Time		t_F			64.5	140	ns
Total Gate Charge		Q_G	V_{DS}= 520V,I_D=8A, V_{GS}= 10 V (Note 1, 2)		115	130	nC
Gate-Source Charge		Q_{GS}			12		nC
Gate-Drain Charge		Q_{GD}			40		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS} = 0 V, I_S =8A			1.4	V
Maximum Continuous Drain-Source Diode Forward Current		I_S				8	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				32	A
Reverse Recovery Time		t_{RR}	V_{GS} = 0 V, I_S =8A, dI_F/dt = 100 A/μs (Note 2)		365		ns
Reverse Recovery Charge		Q_{RR}			3.4		μC

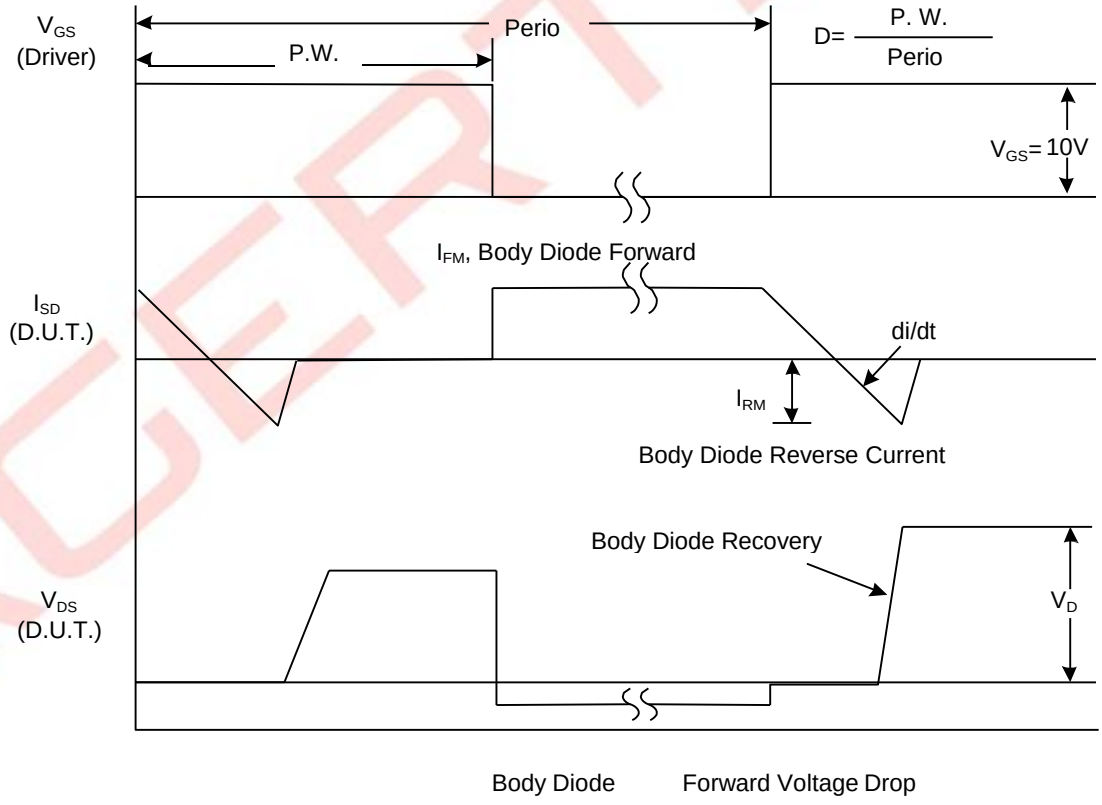
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤2%

2.Essentially independent of operating temperature

TEST CIRCUITS AND WAVEFORMS

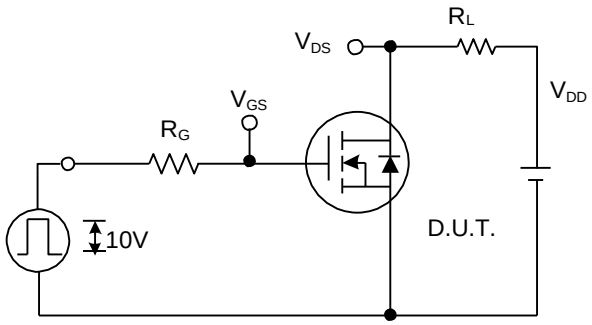


Peak Diode Recovery dv/dt Test Circuit

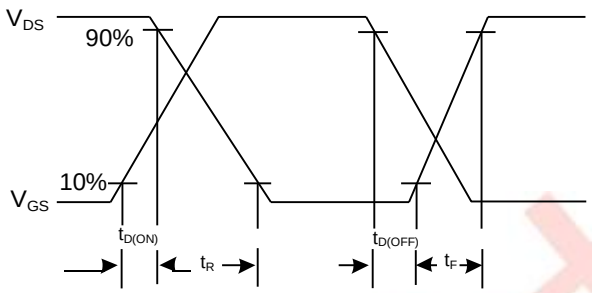


Peak Diode Recovery dv/dt Waveforms

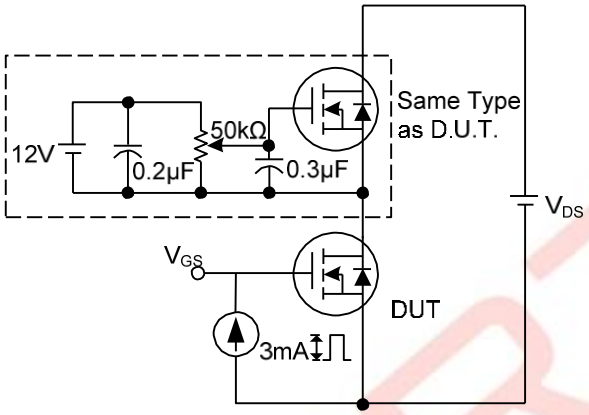
TEST CIRCUITS AND WAVEFORMS (Cont.)



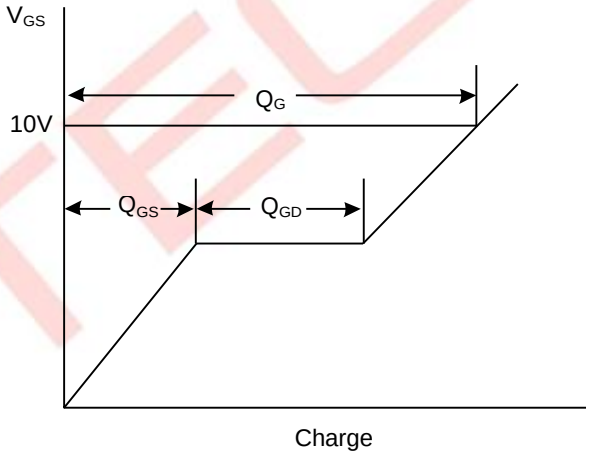
Switching Test Circuit



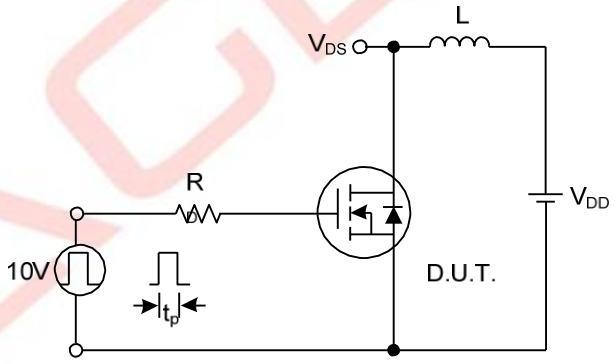
Switching Waveforms



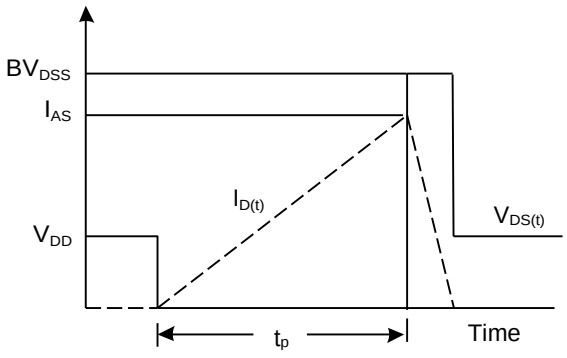
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit

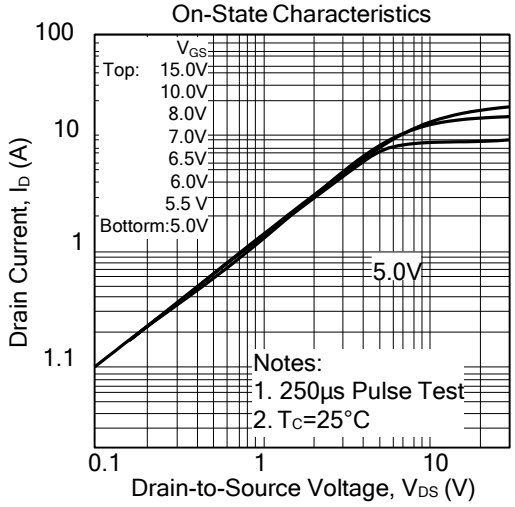


Unclamped Inductive Switching Waveforms

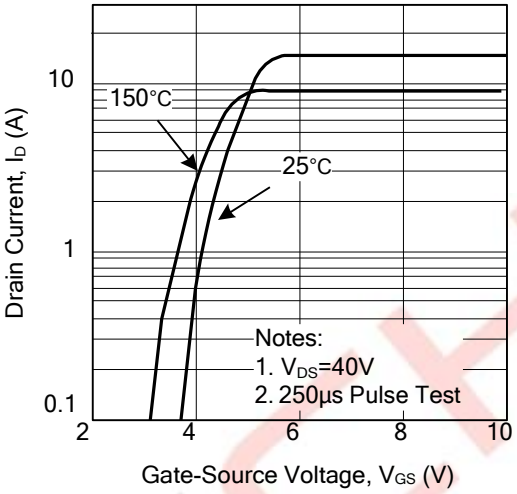
ATM7N65ATE

TYPICAL CHARACTERISTICS CURVES

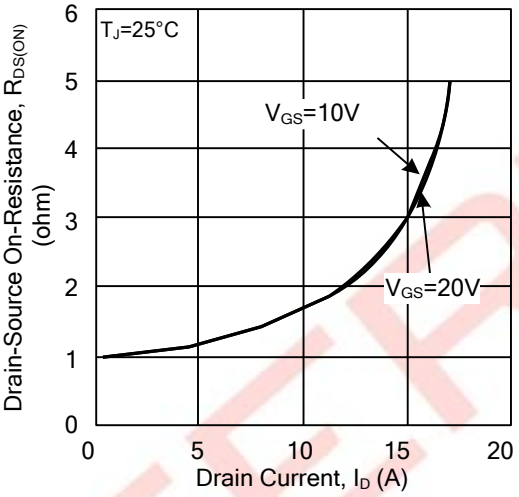
On-State Characteristics



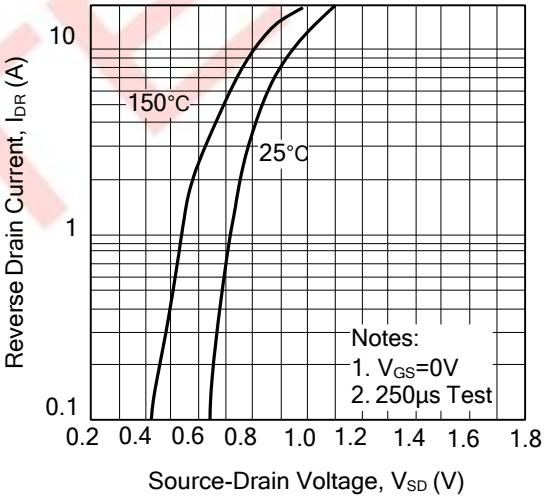
Transfer Characteristics



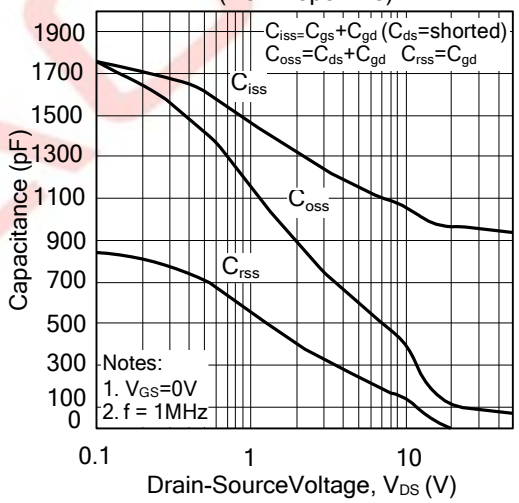
On-Resistance Variation vs. Drain Current and Gate Voltage



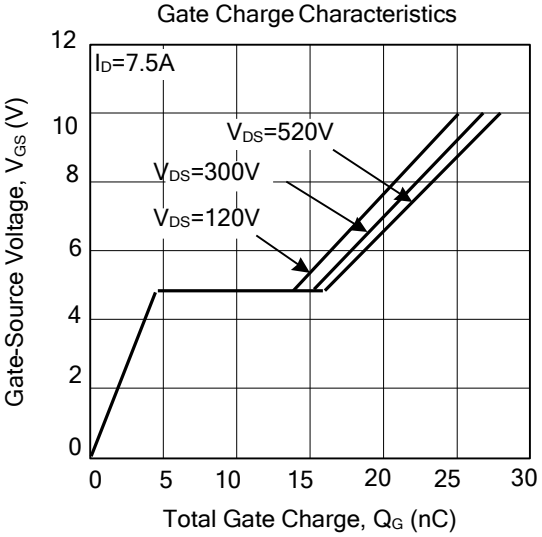
Body Diode Forward Voltage vs. Source Current



Capacitance Characteristics (Non-Repetitive)

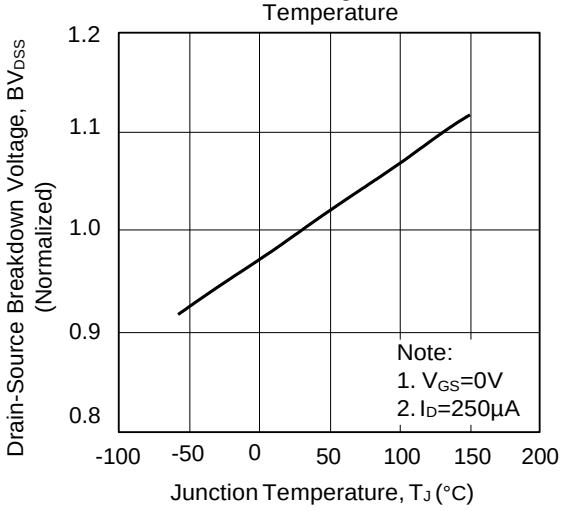


Gate Charge Characteristics

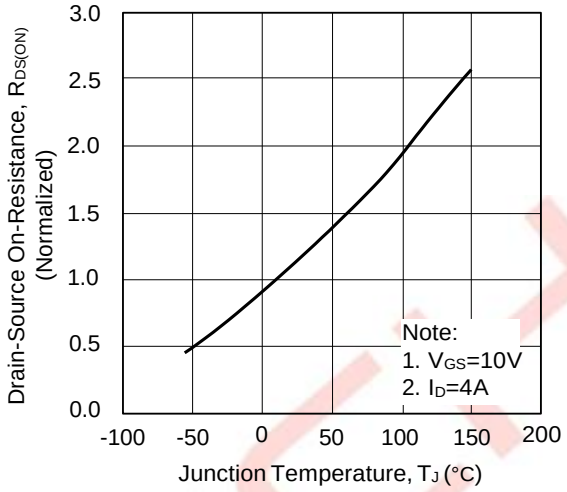


TYPICAL CHARACTERISTICS CURVES(Cont.)

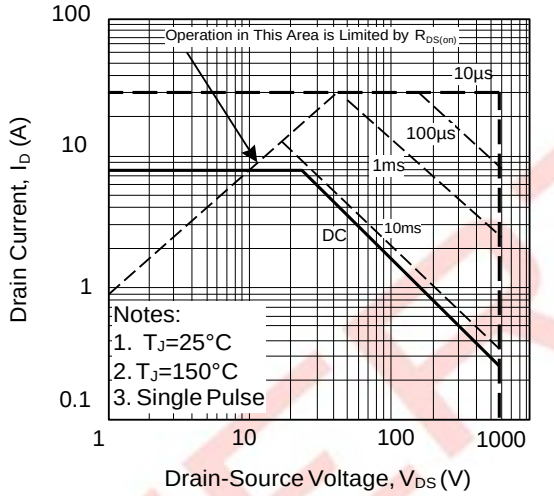
Breakdown Voltage Variation vs. Temperature



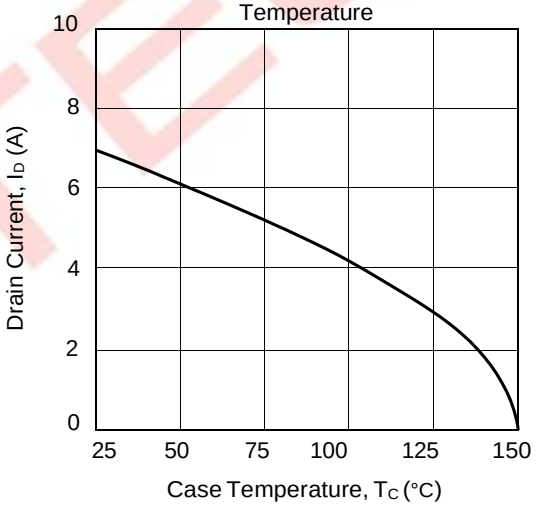
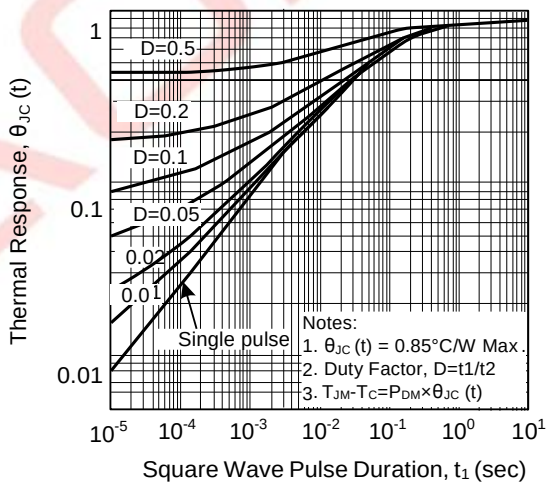
On-Resistance Junction Temperature



Maximum Safe Operating Area



Maximum Drain Current vs. Case Temperature



Transient Thermal Response Curve