ATM4N65TE

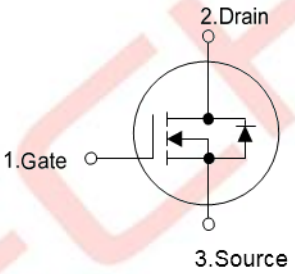
N-Channel Enhancement Mode Power MOSFET

Drain-Source Voltage: 650V Continuous Drain Current: 4A

DESCRIPTION

The ATM4N65TE 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.

TO-252



FEATURES

- $R_{DS(ON)}$ < 2.5Ω @ V_{GS} = 10 V, I_D = 2.2A
- 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 (Note2)		I_{AR}	4.4	A
Drain Current	Continuous	I_D	4.0	A
	Pulsed (Note2)	I_{DM}	16	A
Avalanche Energy	Single Pulsed (Note3)	E_{AS}	260	mJ
	Repetitive (Note2)	E_{AR}	10.6	mJ
Peak Diode Recovery dv/dt (Note4)		dv/dt	4.5	V/ns
Power Dissipation	TO-252	P_D	50	W
Junction Temperature		T_J	+150	°C
Operating Temperature		T_{OPR}	-55 ~ +150	°C
Storage Temperature		T_{STG}	-55 ~ +150	°C

Note: 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 maximum junction temperature.

3. L = 30mH, I_{AS} = 4A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C

4. I_{SD}≤4.4A, di/dt ≤200A/μs, V_{DD}≤BV_{DSS}, Starting T_J = 25°C

ATM4N65TE

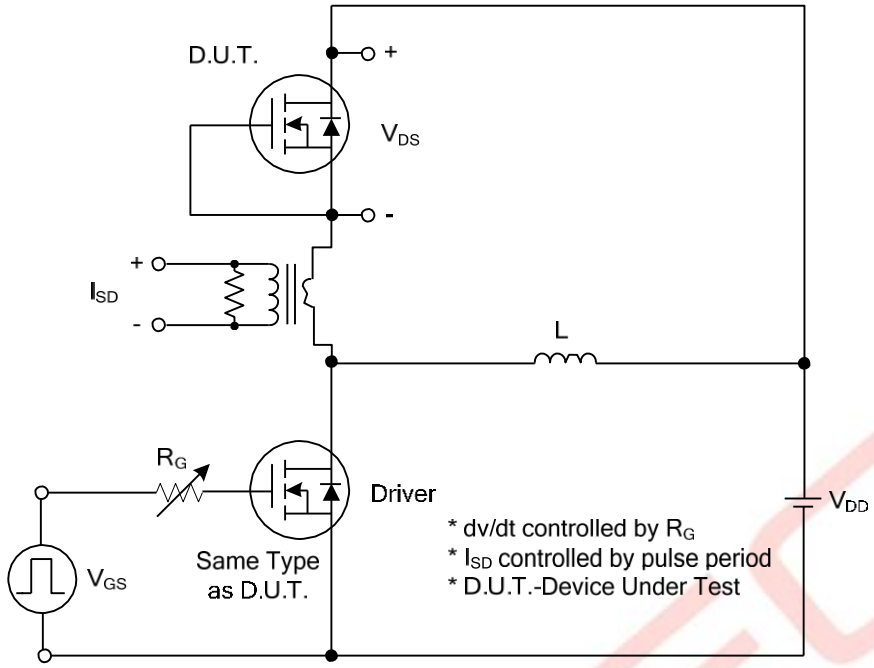
ELECTRICAL CHARACTERISTICS (T_C =25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS} = 0 V, I_D = 250μA	650			V
Drain-Source Leakage Current		I_{DSS}	V_{DS} = 650 V, V_{GS} = 0 V			10	μA
			V_{DS} = 480 V, T_C =125°C			100	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		0.6		V/°C
ON CHARACTERISTICS							
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} = 10 V, I_D = 2.2A		2.4	2.5	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{DS} = 25 V, V_{GS} = 0V, f = 1MHz		670	750	pF
Output Capacitance		C_{OSS}			70	90	pF
Reverse Transfer Capacitance		C_{RSS}			23	26	pF
SWITCHING CHARACTERISTICS							
Total Gate Charge		Q_G	V_{DS}= 520V,I_D= 4.0A, V_{GS}= 10V (Note 1, 2)		100	120	nC
Gate-Source Charge		Q_{GS}			17	19	nC
Gate-Drain Charge		Q_{GD}			20	26	nC
Turn-On Delay Time		$t_{D(ON)}$	V_{DS} = 325V, I_D = 4.0A, R_G = 25Ω (Note 1, 2)		45	85	ns
Turn-On Rise Time		t_R			100	140	ns
Turn-Off Delay Time		$t_{D(OFF)}$			200	240	ns
Turn-Off Fall Time		t_F			130	150	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I_S				4.4	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				17.6	A
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS} = 0 V, I_S = 4.4A			1.4	V
Reverse Recovery Time		t_{rr}	V_{GS} = 0V, I_S = 4.4A, dI_F/dt = 100 A/μs (Note 1)		250		ns
Reverse Recovery Charge		Q_{rr}			1.5		μC

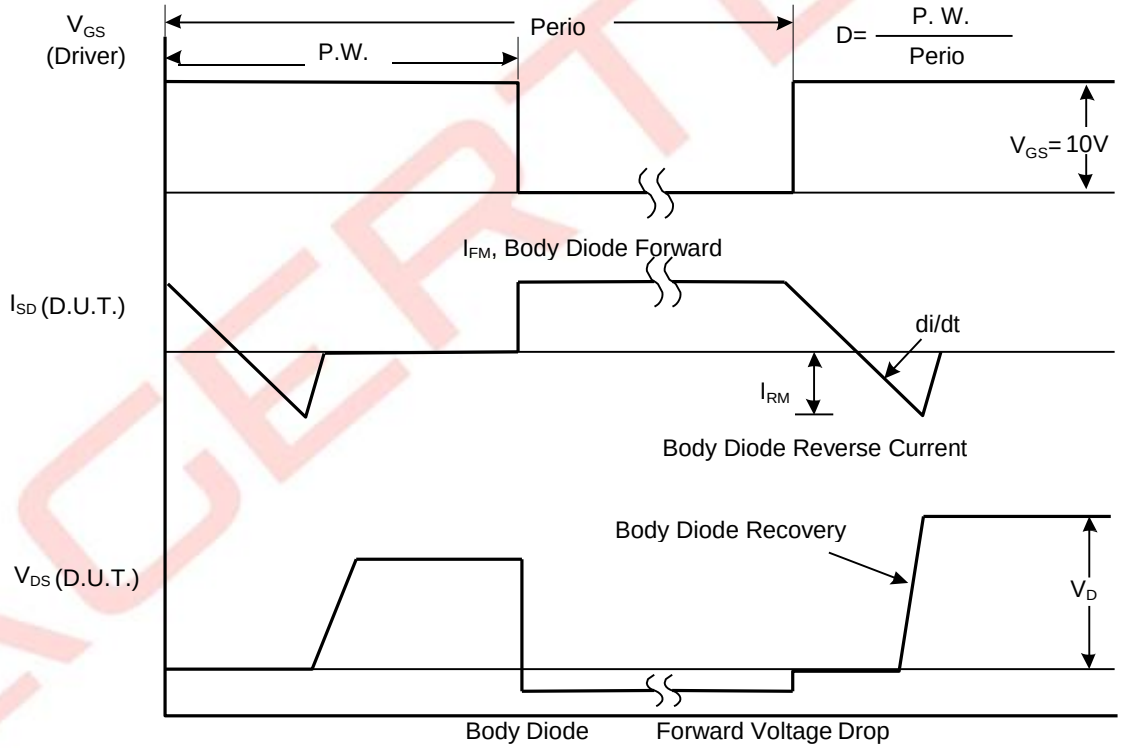
Note: 1. Pulse Test: Pulse width≤300μs, Duty cycle≤2%.

2..Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

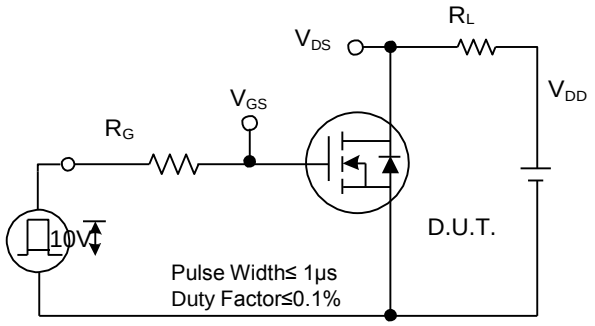


Peak Diode Recovery dv/dt Test Circuit

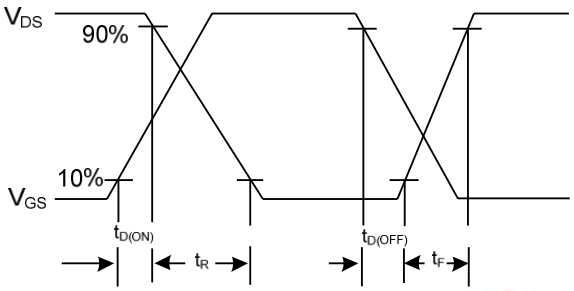


Peak Diode Recovery dv/dt Waveforms

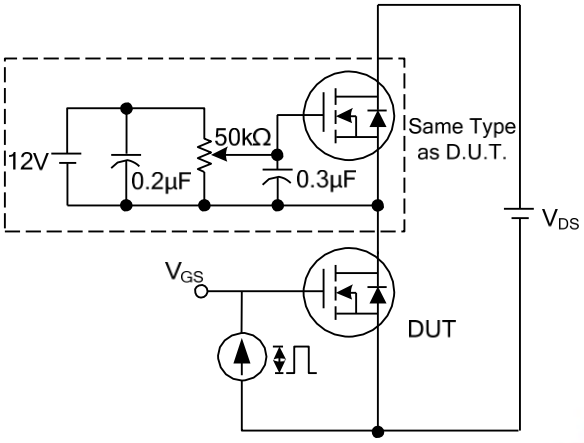
TEST CIRCUITS AND WAVEFORMS (Cont.)



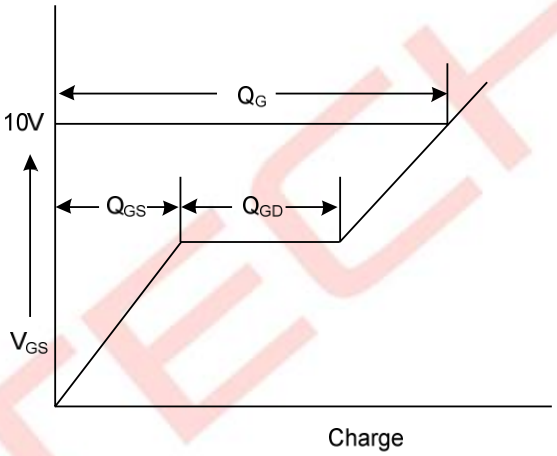
Switching Test Circuit



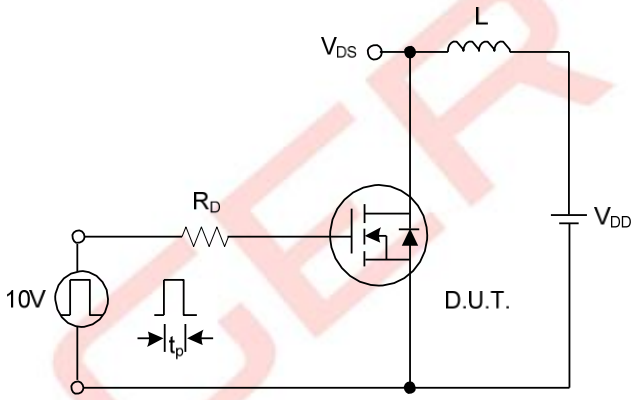
Switching Waveforms



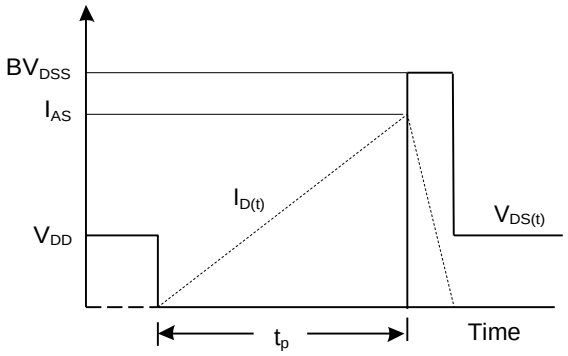
Gate Charge Test Circuit



Gate Charge Waveform



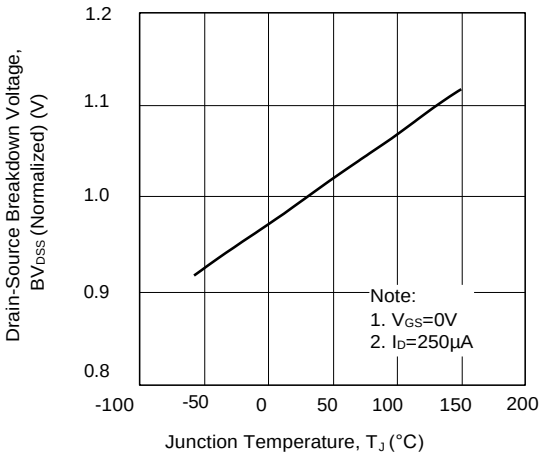
Unclamped Inductive Switching Test Circuit



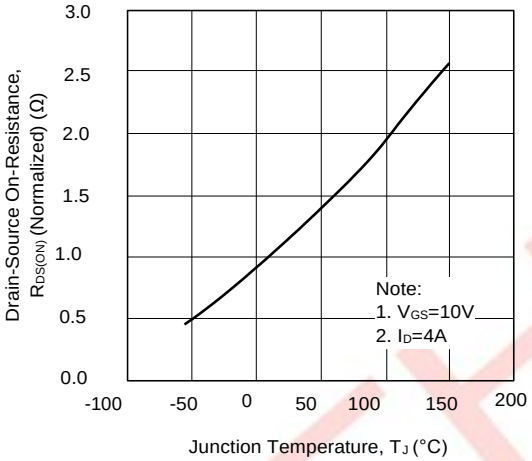
Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS CURVES

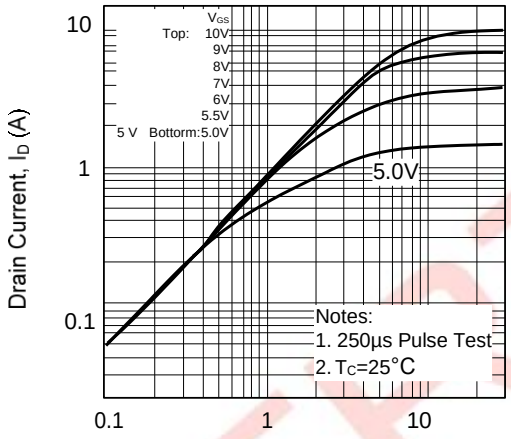
Breakdown Voltage Variation vs. Temperature



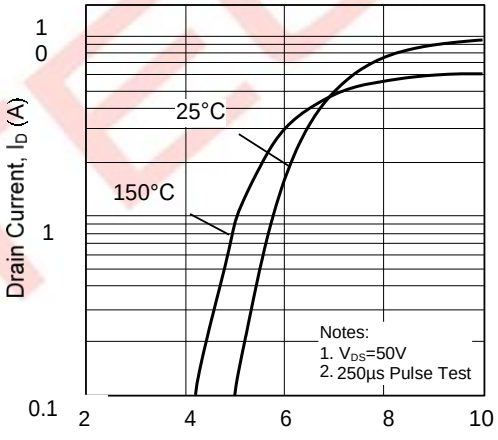
On-Resistance Junction Temperature



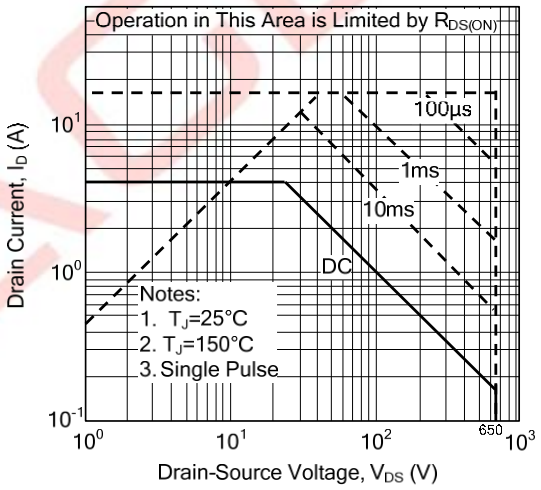
On-State Characteristics



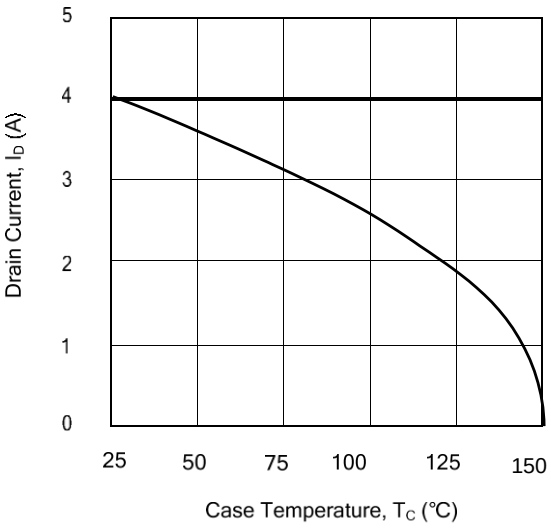
Transfer Characteristics



Safe Operating Area

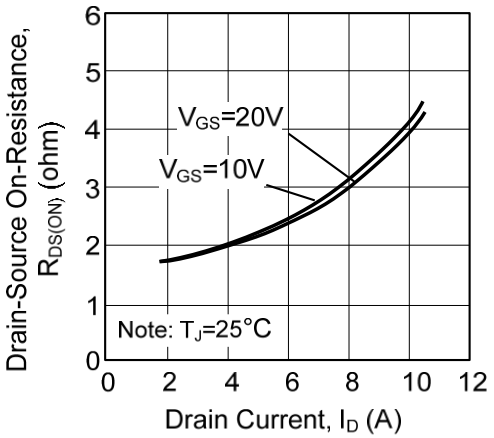


Maximum Drain Current vs. Case Temperature

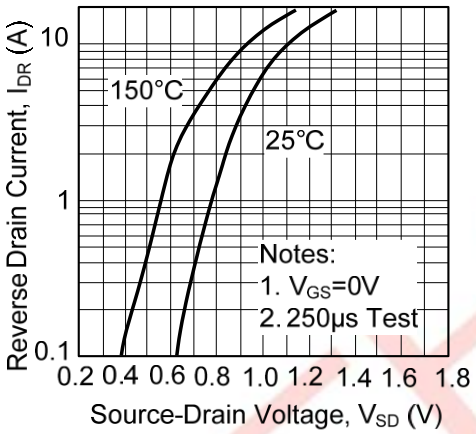


TYPICAL CHARACTERISTICS CURVES(Cont.)

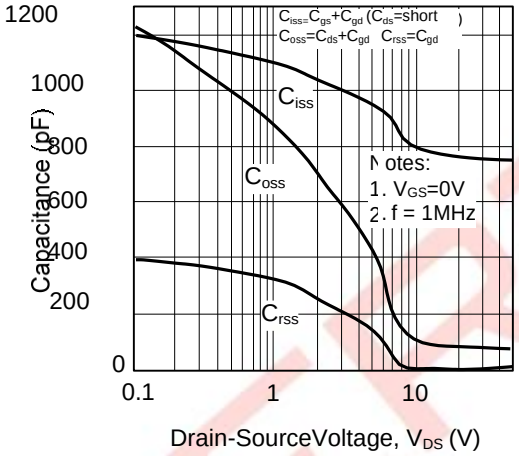
On-Resistance Variation vs. Drain Current and Gate Voltage



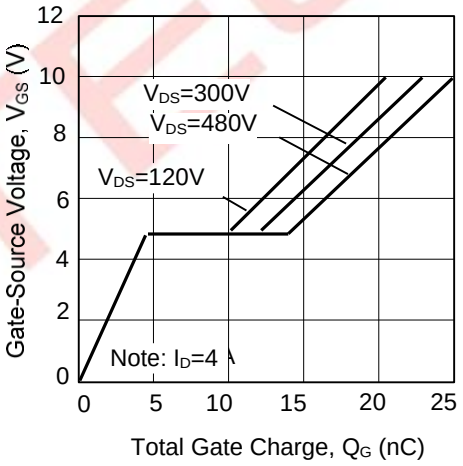
On State Current vs. Allowable Case Temperature



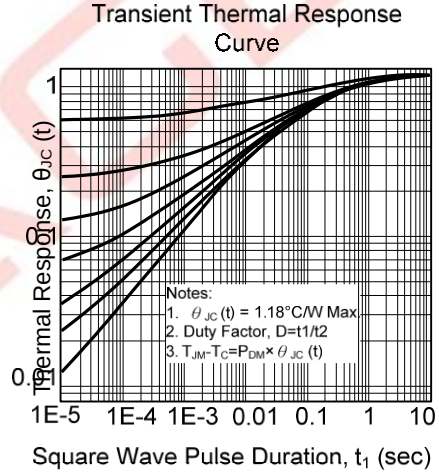
Capacitance Characteristics (Non-Repetitive)



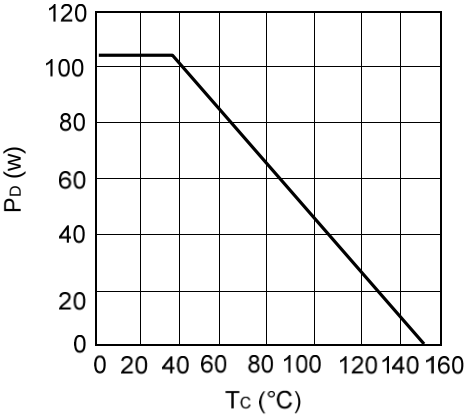
Gate Charge Characteristics



Transient Thermal Response Curve



Power Dissipation



Package Outline

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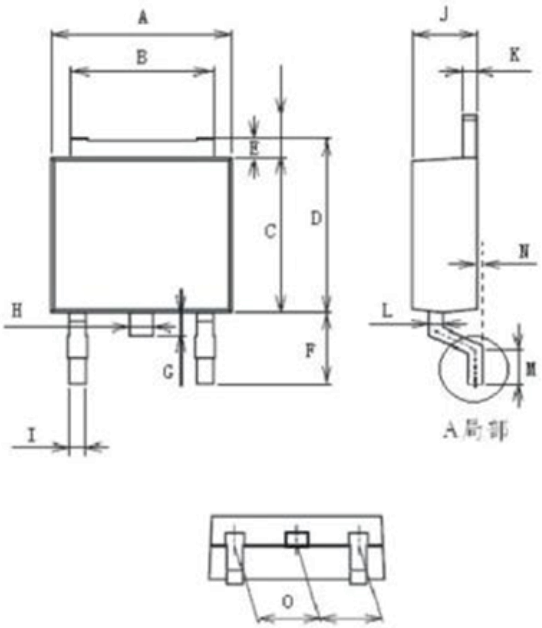

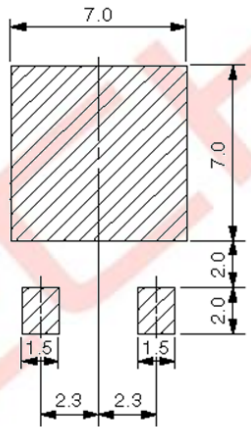

Symbol	Dimensions In Millimeters	
	Min.	Max.
A	6.40	6.70
B	5.20	5.40
C	6.00	6.30
D	6.55	6.85
E	0.45	0.60
F	3.07	3.35
G	0.85	1.05
H	0.75	0.95
I	0.55	0.75
J	2.20	2.40
K	0.43	0.58
L	0.90	1.10
N	0.90	1.10
O	2.20	2.40