

12N65

650V N-Channel Power MOSFET

Features

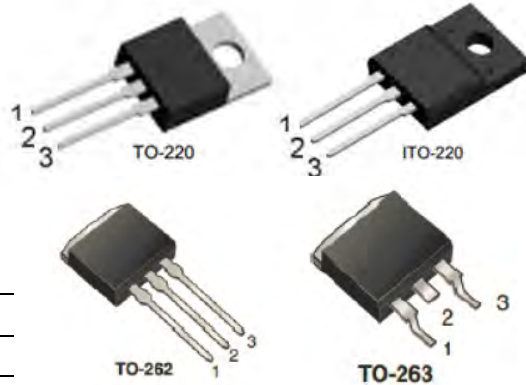
- $R_{DS(ON)} < 0.85\Omega @ V_{GS}=10V$
- Fast switching capability
- Low gate charge
- Lead free in compliance with EU RoHS directive.
- Green molding compound

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
650	0.85@ $V_{GS}=10V$	12

Pin Definition:

1. Gate
2. Drain
3. Source



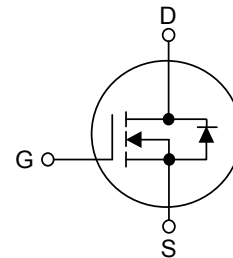
Mechanical Data

- Case: TO-220, ITO-220, TO-262, TO-263 Package

Ordering Information

Part No.	Package	Packing
DMT12N65-TU	TO-220	50pcs / Tube
DMF12N65-TU	ITO-220	50pcs / Tube
DMK12N65-TU	TO-262	50pcs / Tube
DMG12N65-TU	TO-263	50pcs / Tube
DMG12N65-TR	TO-263	800pcs / 13" Reel

Block Diagram



ABSOLUTE MAXIMUM RATINGS ($T_C=25^\circ C$, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	V_{DSS}	650	V
Gate-Source Voltage	V_{GSS}	± 30	V
Continuous Drain Current	I_D	12	A
Pulsed Drain Current (Note 2)	I_{DM}	48	A
Avalanche Energy	Single Pulsed (Note 3) E_{AS}	790	mJ
Power Dissipation	TO-220/TO-262/TO-263	225	W
	ITO-220	51	W
Junction Temperature	T_J	+150	$^\circ C$
Operating Temperature	T_{OPR}	-55 ~ +150	$^\circ C$
Storage Temperature	T_{STG}	-55 ~ +150	$^\circ C$

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. $L = 30mH$, $I_{AS} = 7.1A$, $V_{DD} = 50V$, $R_G = 25 \Omega$, Starting $T_J = 25^\circ C$

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THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/ITO-220 TO-262/TO-263	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	0.56	$^{\circ}\text{C}/\text{W}$
	ITO-220		2.6	

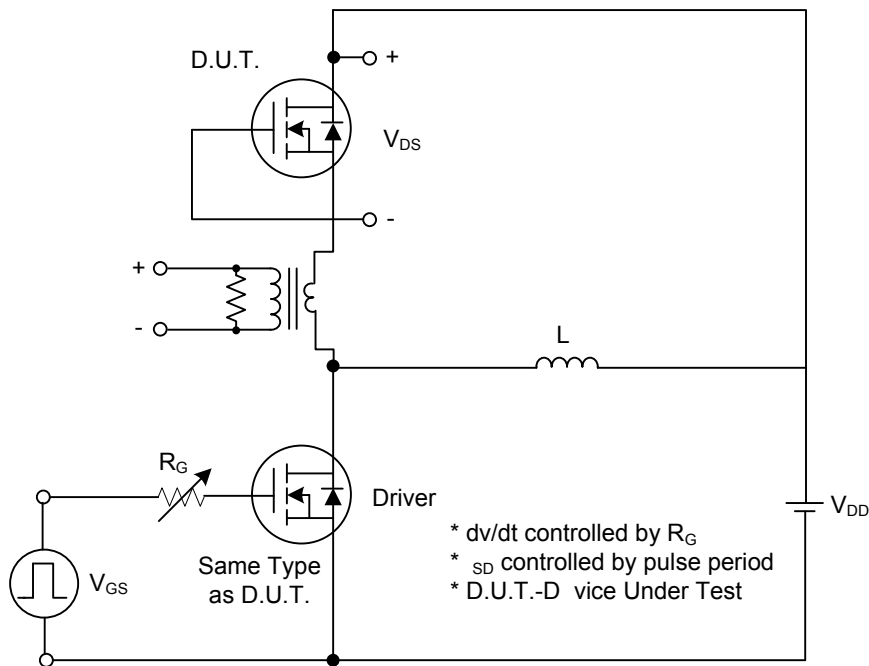
ELECTRICAL CHARACTERISTICS ($T_C=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$	650			V
Drain-Source Leakage Current		I_{DSS}	$V_{DS}=650\text{V}, V_{GS}=0\text{V}$			1	μA
Gate- Source Leakage Current	Forward	I_{GSS}	$V_{GS}=30\text{V}, V_{DS}=0\text{V}$			100	nA
	Reverse		$V_{GS}=-30\text{V}, V_{DS}=0\text{V}$			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	$X_{\theta S}=10\text{V}, I_D=6\text{A}$		0.65	0.85	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	$V_{DS}=25\text{V}, V_{GS}=0\text{V}, f=1.0\text{MHz}$		1480		pF
Output Capacitance		C_{OSS}			200		pF
Reverse Transfer Capacitance		C_{RSS}			25		pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		$t_{D(ON)}$	$V_{DD}=300\text{V}, I_D=12\text{A},$ $R_G=25\Omega$ (Note 1, 2)		30		ns
Turn-On Rise Time		t_R			115		ns
Turn-Off Delay Time		$t_{D(OFF)}$			95		ns
Turn-Off Fall Time		t_F			85		ns
Total Gate Charge		Q_G	$V_{DS}=480\text{V}, I_D=12\text{A},$ $V_{GS}=10\text{V}$ (Note 1, 2)		42		nC
Gate-Source Charge		Q_{GS}			8.6		nC
Gate-Drain Charge		Q_{GD}			21		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Drain-Source Diode Forward Voltage		V_{SD}	$V_{GS}=0\text{V}, I_S=12\text{A}$			1.4	V
Maximum Continuous Drain-Source Diode Forward Current		I_S				12	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				48	A
Reverse Recovery Time		t_{rr}	$V_{GS}=0\text{V}, I_S=12\text{A},$		570		ns
Reverse Recovery Charge		Q_{RR}	$dI_F/dt=100\text{A}/\mu\text{s}$ (Note 1)		5.5		μC

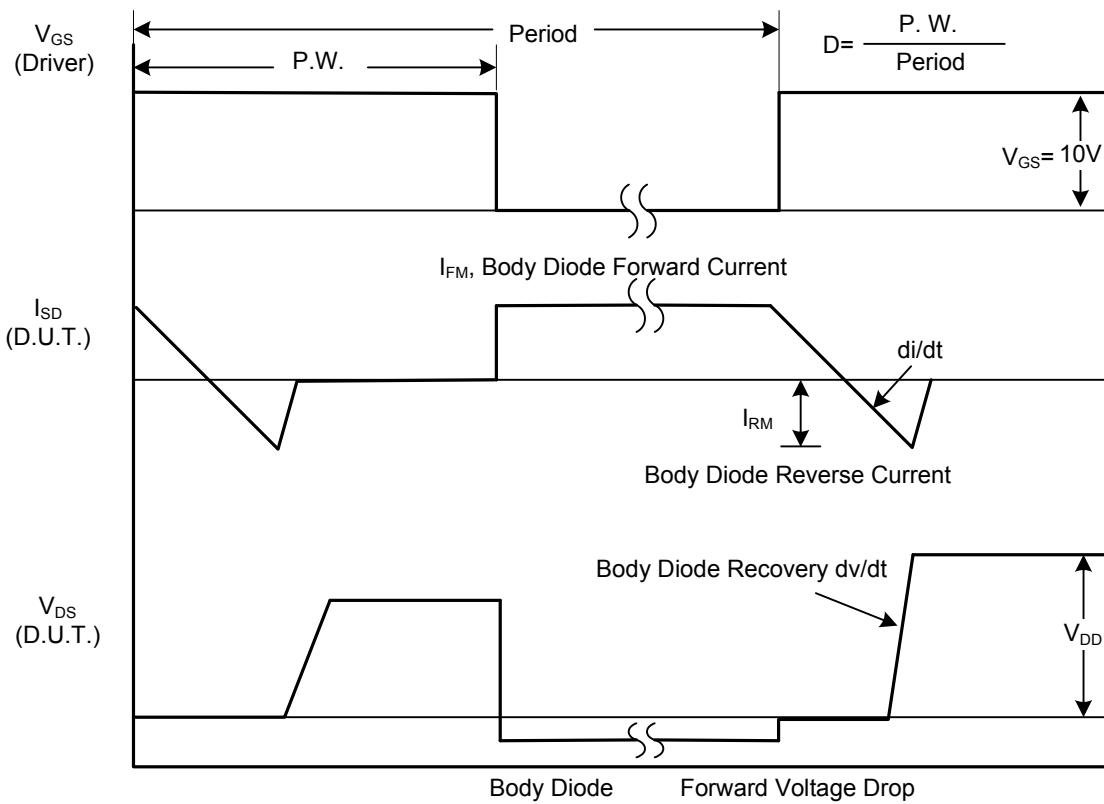
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS



Peak Diode Recovery dv/dt Test Circuit

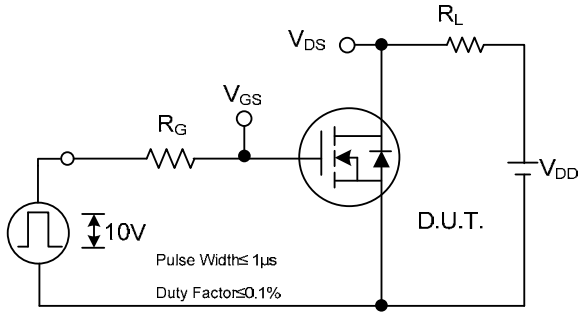


Peak Diode Recovery dv/dt Waveforms

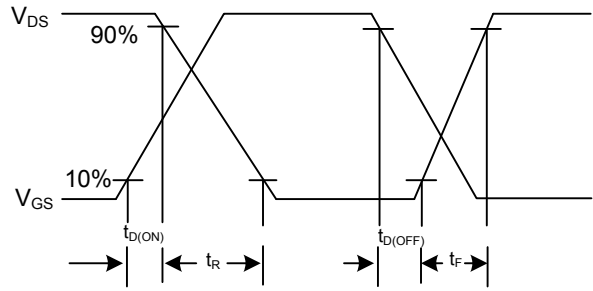
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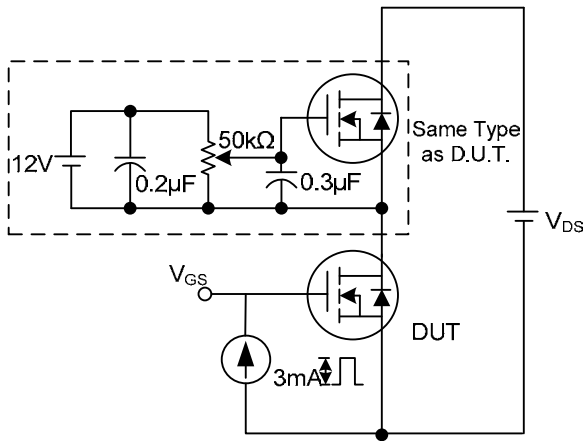
TEST CIRCUITS AND WAVEFORMS(Cont.)



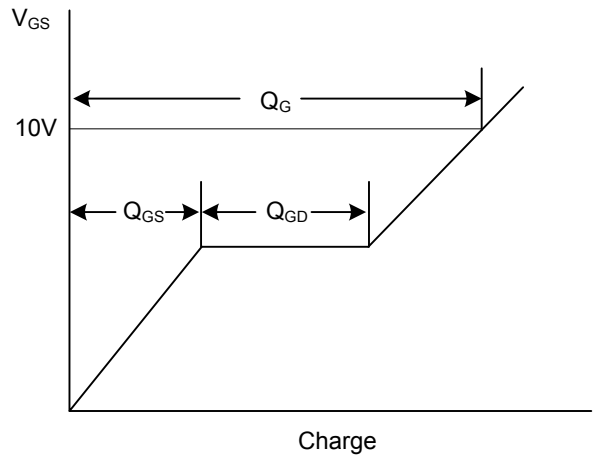
Switching Test Circuit



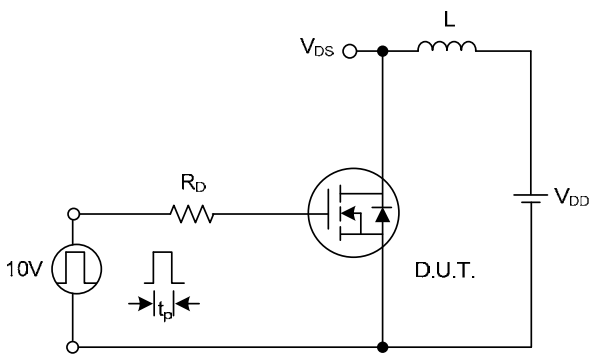
Switching Waveforms



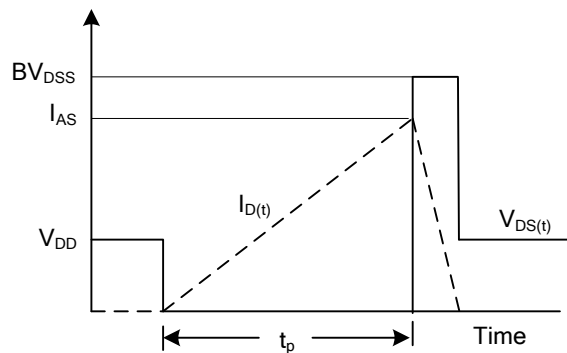
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit

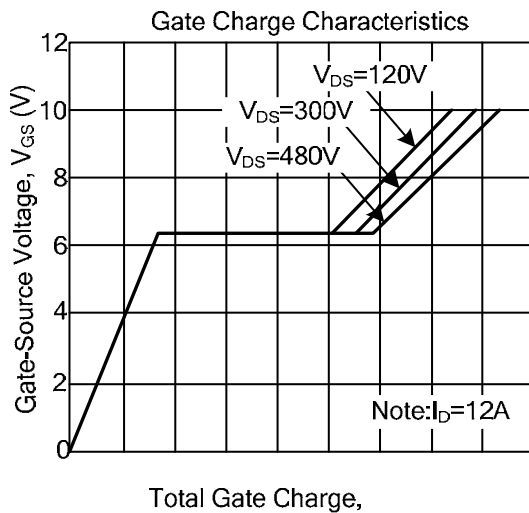
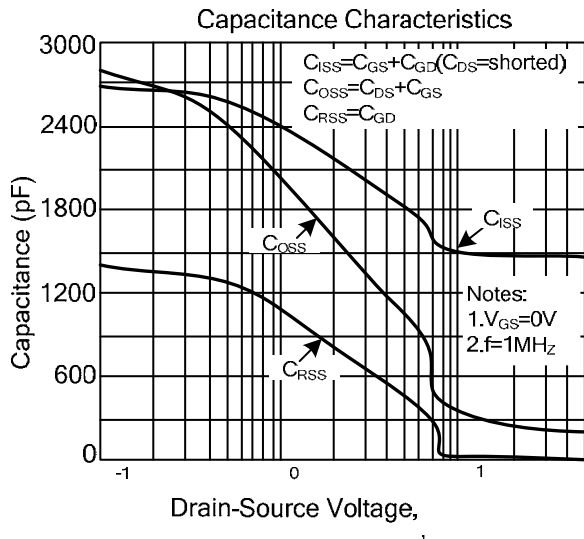
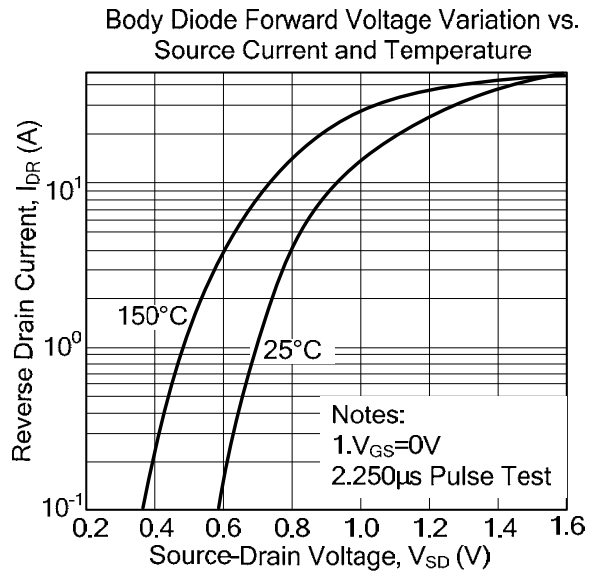
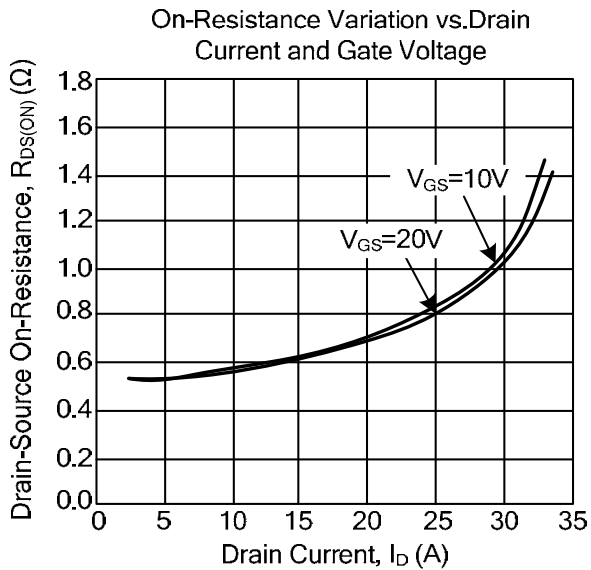
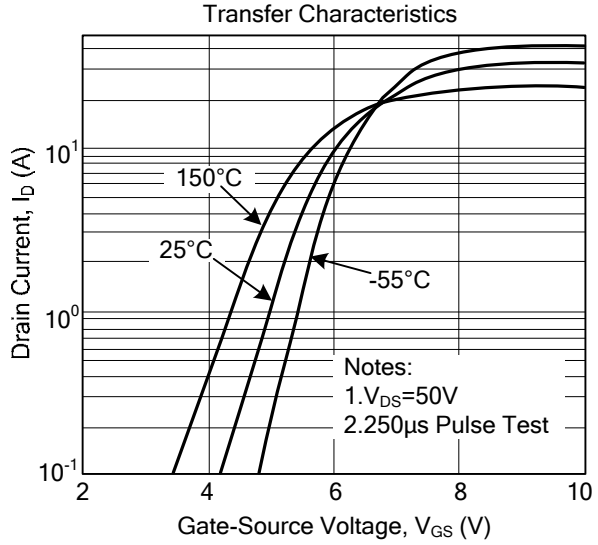
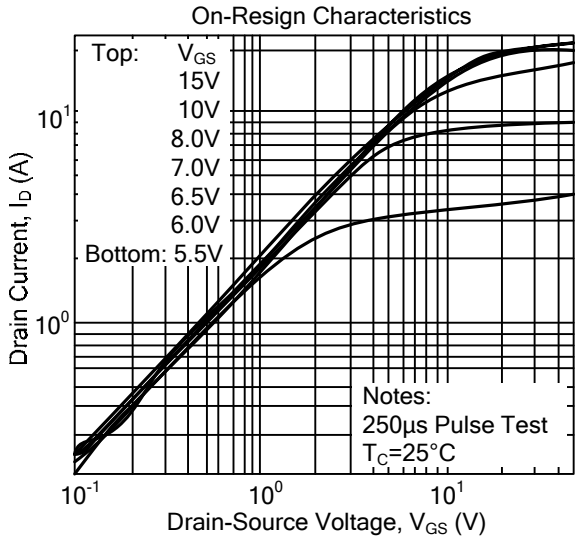


Unclamped Inductive Switching Waveforms

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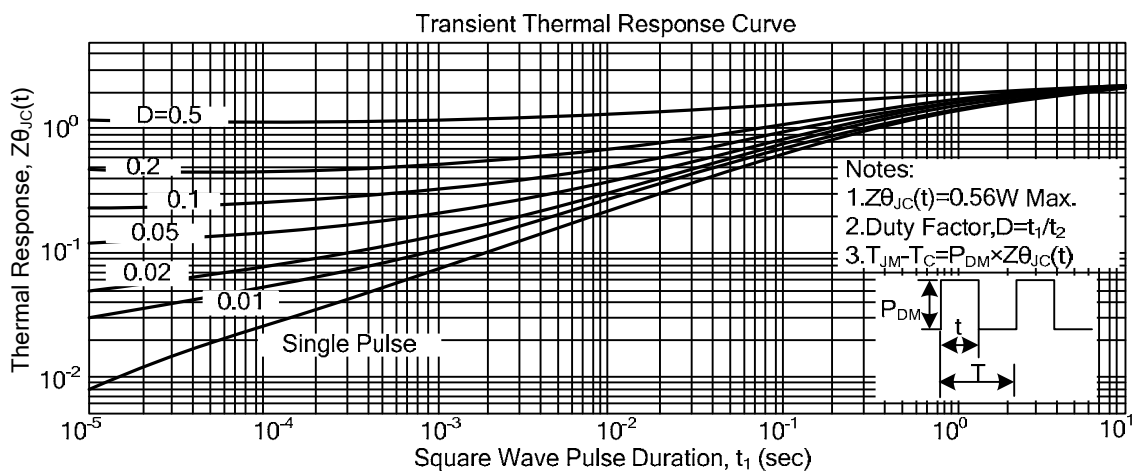
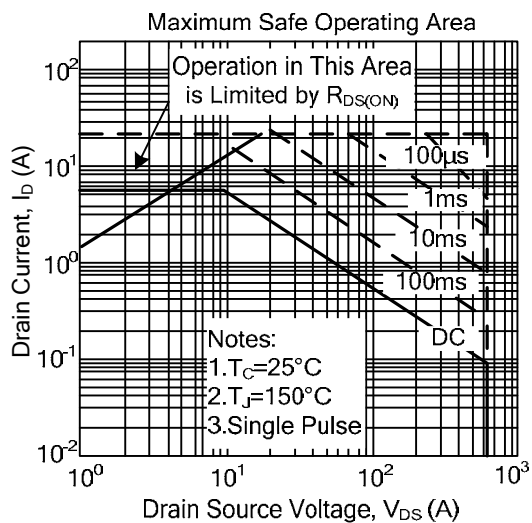
TYPICAL CHARACTERISTICS



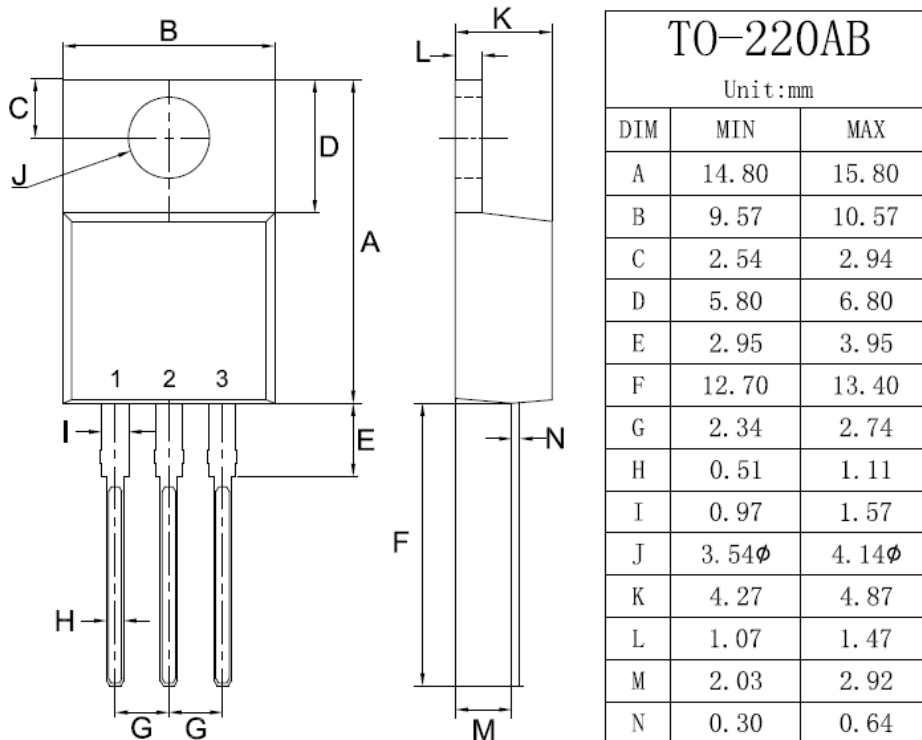
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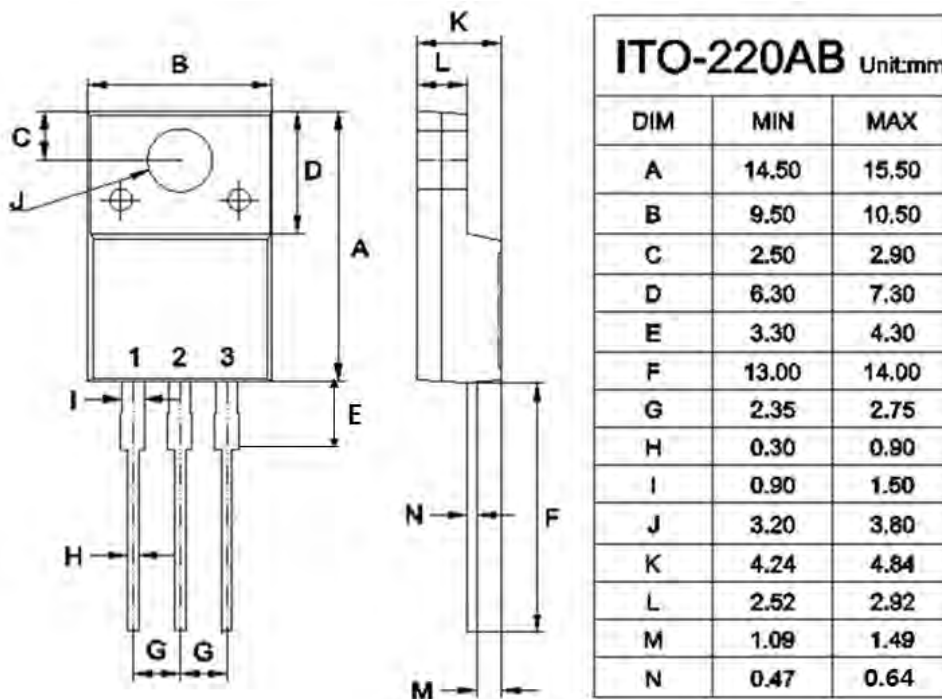
TYPICAL CHARACTERISTICS



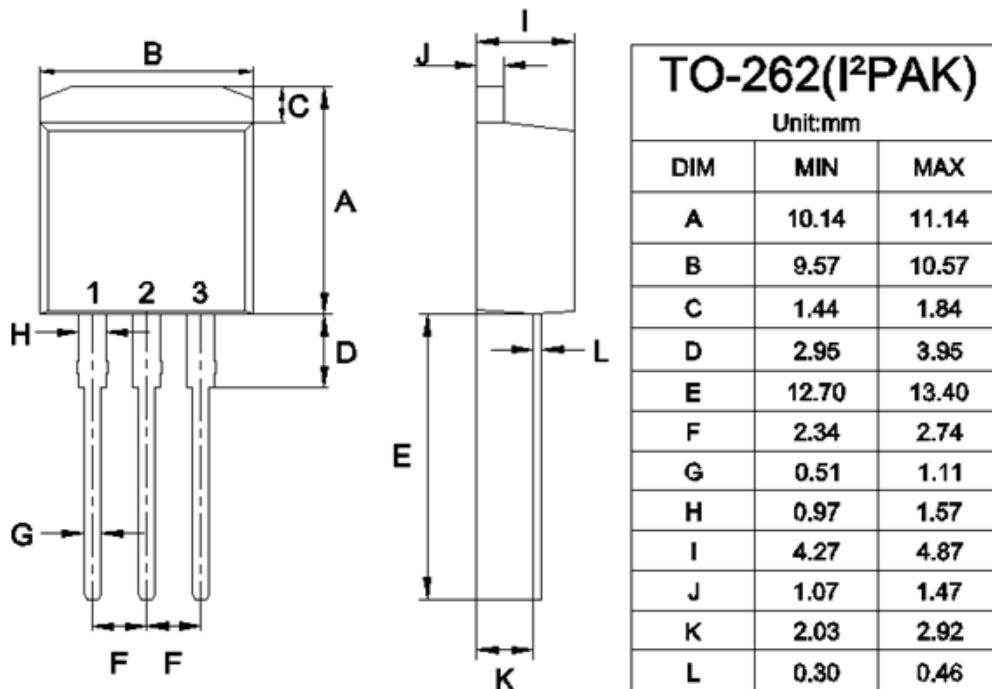
TO-220 Mechanical Drawing



ITO-220 Mechanical Drawing



TO-262 Mechanical Drawing



TO-263 Mechanical Drawing

