7N65

650V N-Channel Power MOSFET

Features

- $R_{DS(ON)}$<1.5Ω @ V_{GS}=10V
- Fast switching capability
- Low gate charge
- Lead free in compliance with EU RoHS directive.
- Green molding compound

PRODUCT SUMMARY

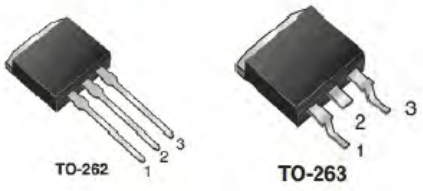
V_{DS} (V)	$R_{DS(on)}$(Ω)	I_D (A)
650	1.5 @ V_{GS} =10V	7

Pin Definition:

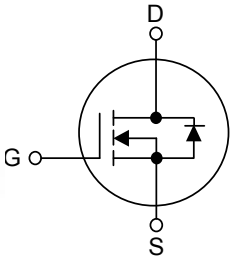
1. Gate
2. Drain
3. Source

Mechanical Data

- Case:TO-220,ITO-220,TO-262,TO-263, TO-251,TO-252 Package



Block Diagram



Part No.	Package	Packing
DMP7N65-TU	TO-251	75pcs / Tube
DMD7N65-TR	TO-252	2.5Kpcs / 13” Reel
DMD7N65-TU	TO-252	75pcs / Tube
DMT7N65-TU	TO-220	50pcs / Tube
DMF7N65-TU	ITO-220	50pcs / Tube
DMK7N65-TU	TO-262	50pcs / Tube
DMG7N65-TU	TO-263	50pcs / Tube
DMG7N65-TR	TO-263	800pcs / 13" Reel

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
Continuous Drain Current		I_D	7	A
Pulsed Drain Current (Note 2)		I_{DM}	28	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	435	mJ
Power Dissipation	TO-220/TO-262/TO-263	P_D	142	W
	ITO-220		48	W
	TO-251/TO-252		32	W
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. Repetitive Rating : Pulse width limited by T_J
3. L = 30mH, I_{AS} = 5.25A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C

THERMAL DATA

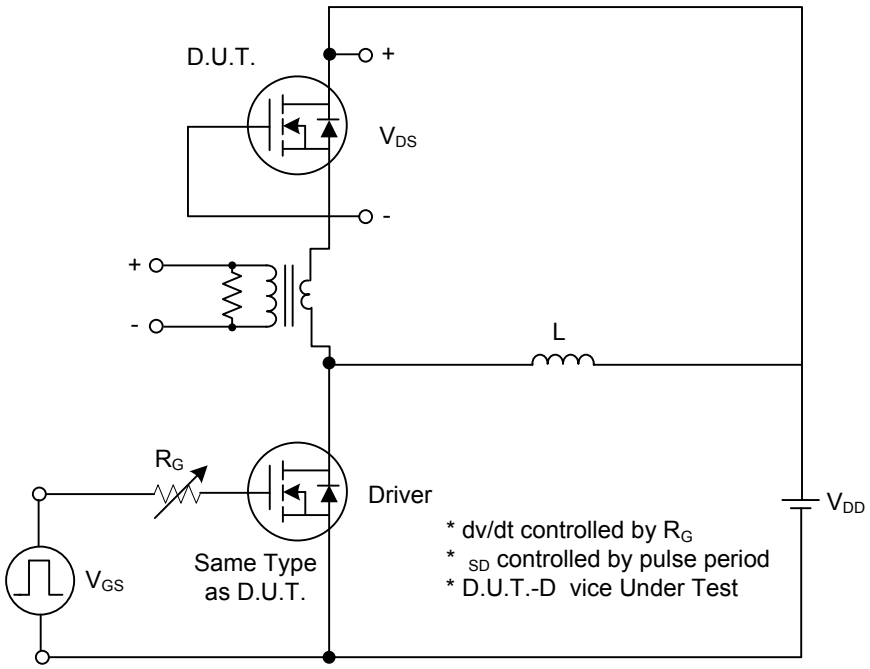
PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/ITO-220 TO-262/TO-263	θ_{JA}	62.5	°C/W
	TO-251/ TO-252		110	
Junction to Case	TO-220/ITO-220 TO-262/TO-263	θ_{JC}	2.35	°C/W
	ITO-220		5.5	
	TO-251/ TO-252		2.9	

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

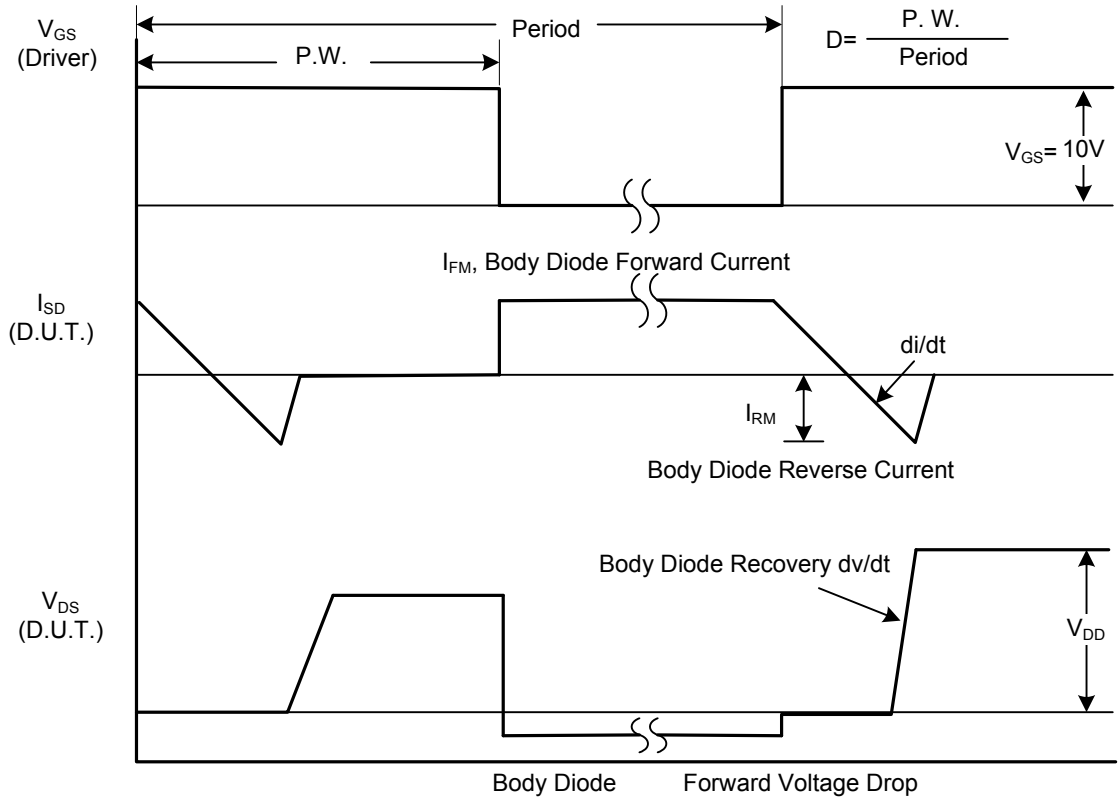
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250μA	650			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=650V, V_{GS}=0V			1	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_G=30V, V_{DS}=0V			100	nA
	Reverse		V_{GS}=-30V, V_{DS}=0V			-100	nA
Breakdown Voltage Temperature Coefficient		$\triangle BV_{DSS}/\triangle T_J$	I_D=250μA, Referenced to 25°C		0.67		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}= 10V, I_D = 3.5A		1.35	1.5	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1.0 MHz		1210	1400	pF
Output Capacitance		C_{OSS}			140	180	pF
Reverse Transfer Capacitance		C_{RSS}			40	50	pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		$t_{D(ON)}$	V_{DD} =300V, I_D =7A, R_G =25Ω (Note 1, 2)		50	70	ns
Turn-On Rise Time		t_R			150	180	ns
Turn-Off Delay Time		$t_{D(OFF)}$			380	410	ns
Turn-Off Fall Time		t_F			180	220	ns
Total Gate Charge		Q_G	V_{DS}=520V, I_D=7A, V_{GS}=10V (Note 1, 2)		29	38	nC
Gate-Source Charge		Q_{GS}			9		nC
Gate-Drain Charge		Q_{GD}			19		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_S = 7A			1.4	V
Maximum Continuous Drain-Source Diode Forward Current		I_S				7	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				28	A
Reverse Recovery Time		t_{rr}	V_{GS}=0V, I_S=7.0A, dI_F/dt =100 A/μs (Note 1)		490		ns
Reverse Recovery Charge		Q_{RR}			3.2		μC

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

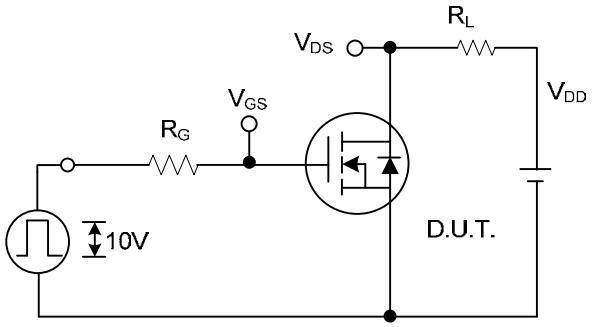


Peak Diode Recovery dv/dt Test Circuit

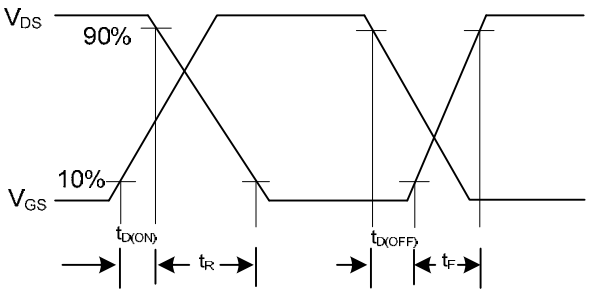


Peak Diode Recovery dv/dt Waveforms

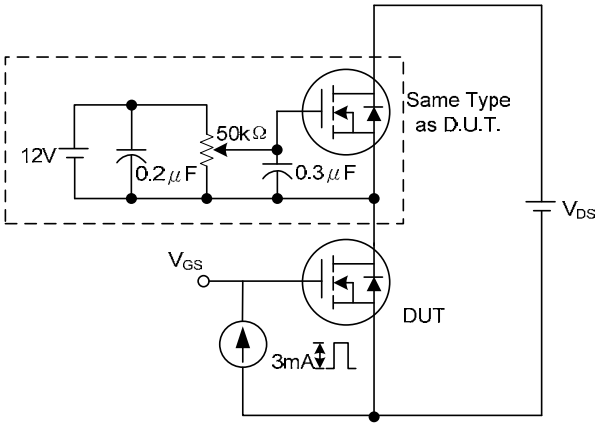
TEST CIRCUITS AND WAVEFORMS(Cont.)



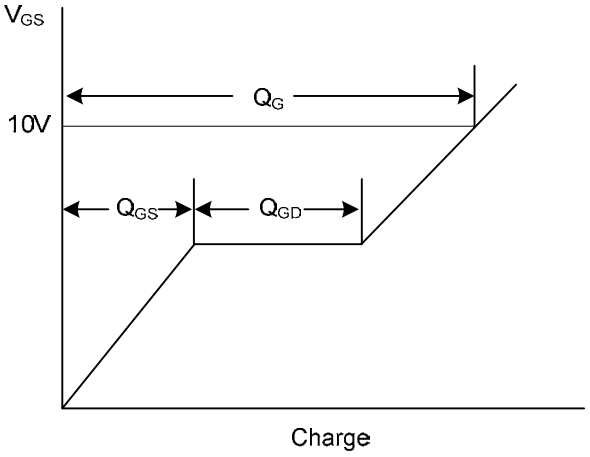
Switching Test Circuit



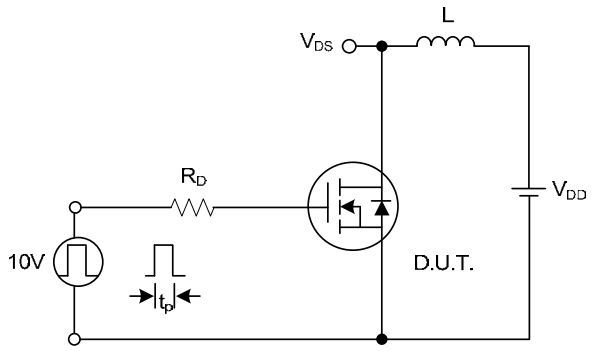
Switching Waveforms



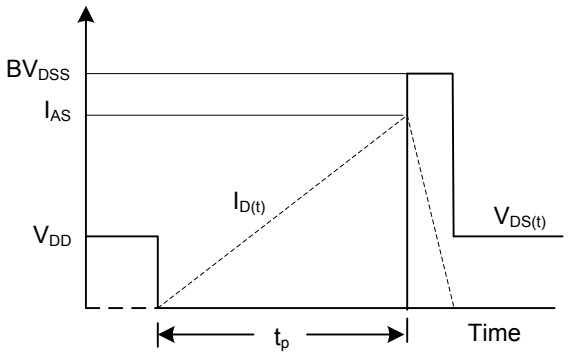
Gate Charge Test Circuit



Gate Charge Waveform



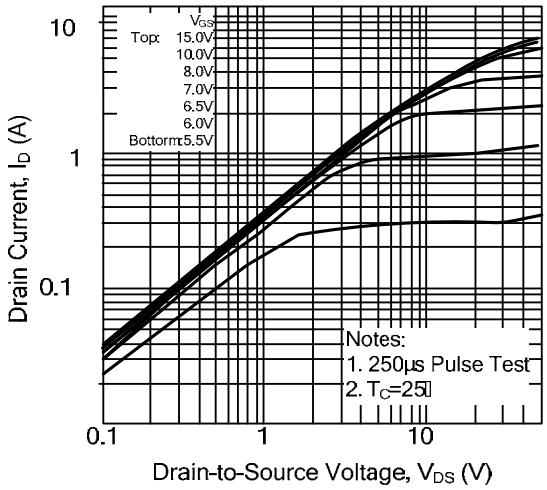
Unclamped Inductive Switching Test Circuit



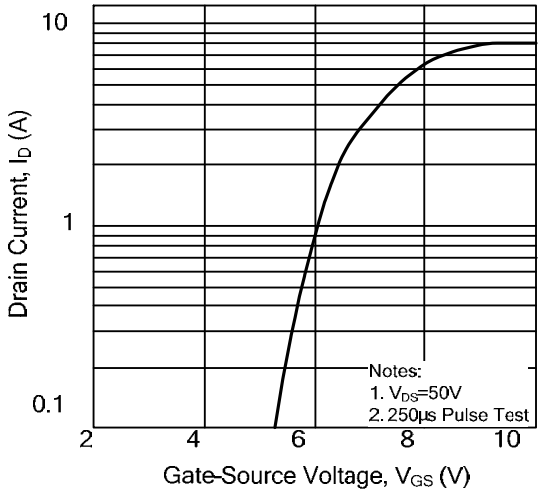
Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS

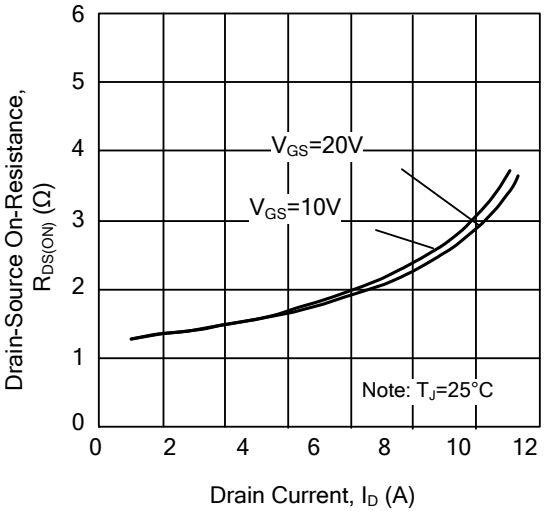
On-State Characteristics



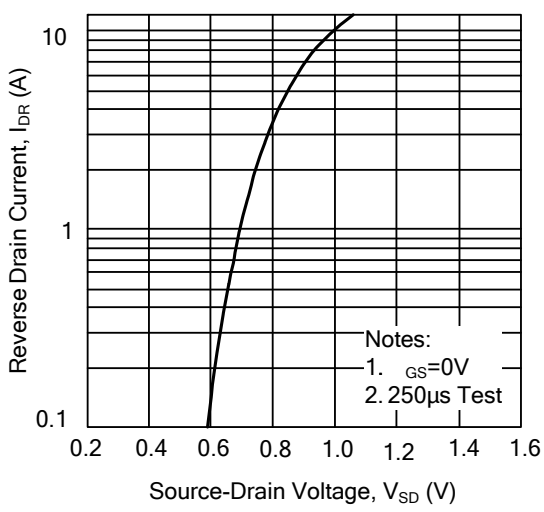
Transfer Characteristics



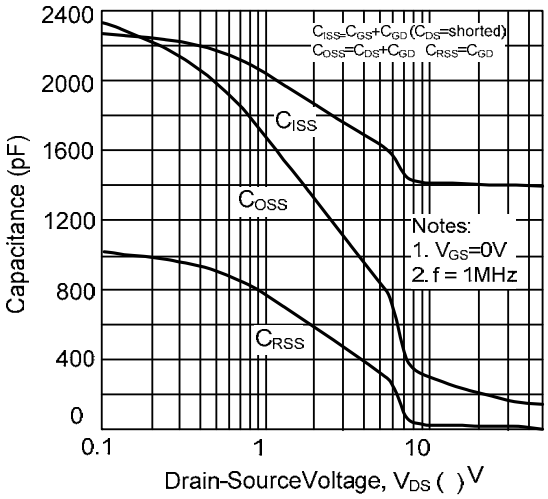
On-Resistance Variation vs.
Drain Current and Gate Voltage



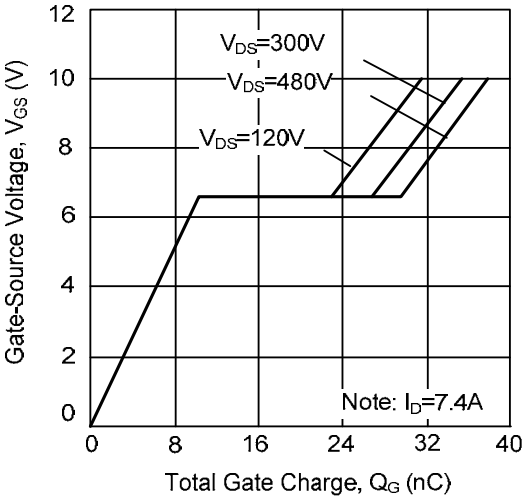
On State Current vs.
Allowable Case Temperature



Capacitance Characteristics
(Non-Repetitive)



Gate Charge Characteristics



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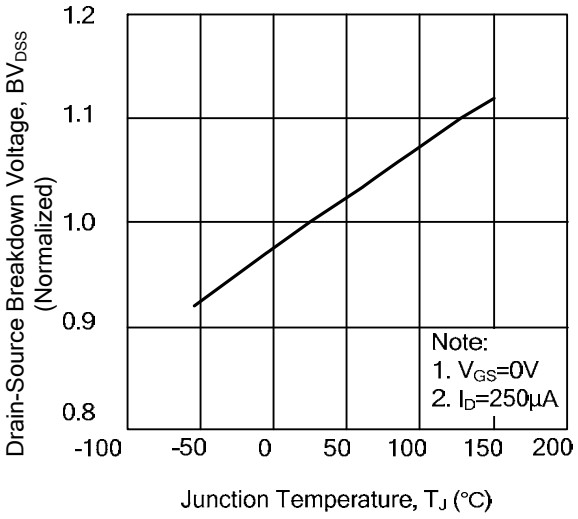
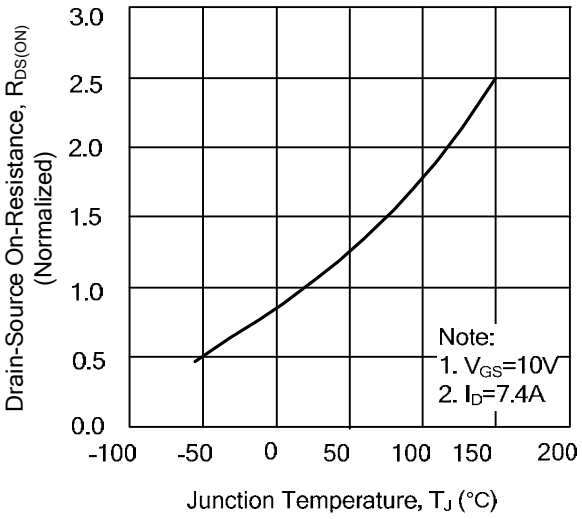
TYPICAL CHARACTERISTICS

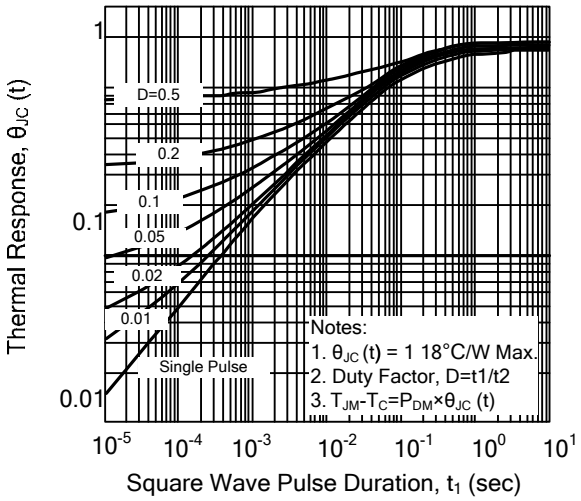
Breakdown Voltage Variation vs. Junction Temperature



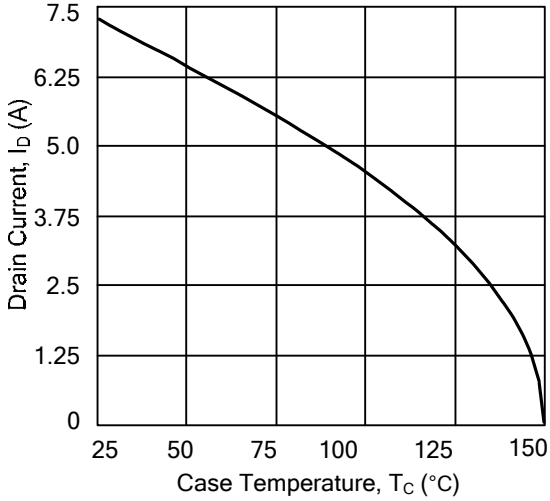
On-Resistance Variation vs. Junction Temperature



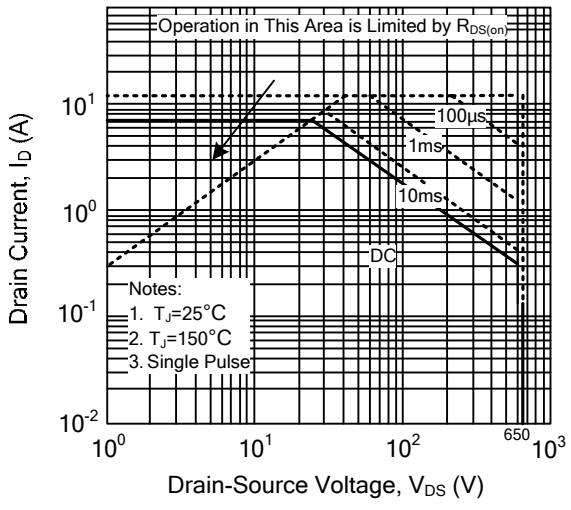
Transient Thermal Response Curve



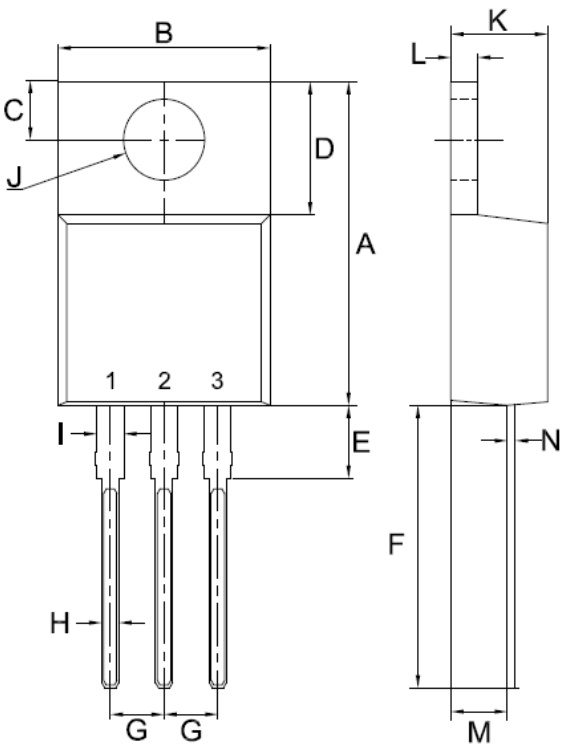
Maximum Drain Current vs. Case Temperature



Safe Operating Area - 650V

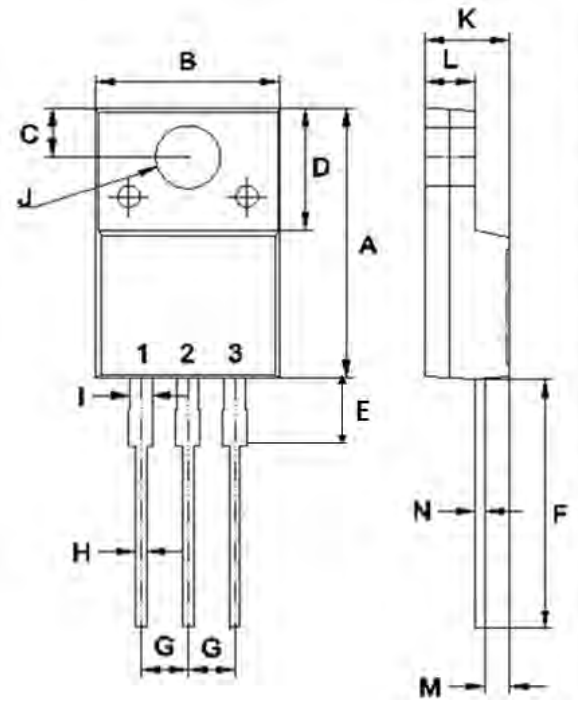


TO-220 Mechanical Drawing



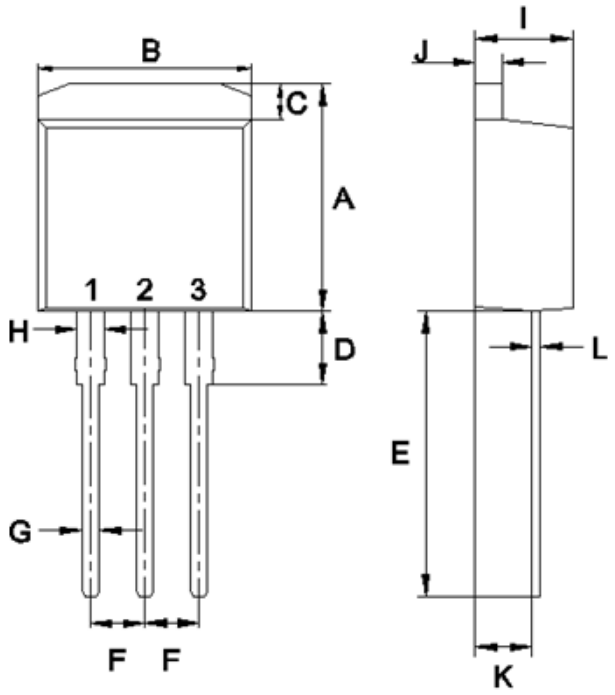
TO-220AB Unit:mm		
DIM	MIN	MAX
A	14.80	15.80
B	9.57	10.57
C	2.54	2.94
D	5.80	6.80
E	2.95	3.95
F	12.70	13.40
G	2.34	2.74
H	0.51	1.11
I	0.97	1.57
J	3.54ϕ	4.14ϕ
K	4.27	4.87
L	1.07	1.47
M	2.03	2.92
N	0.30	0.64

ITO-220 Mechanical Drawing



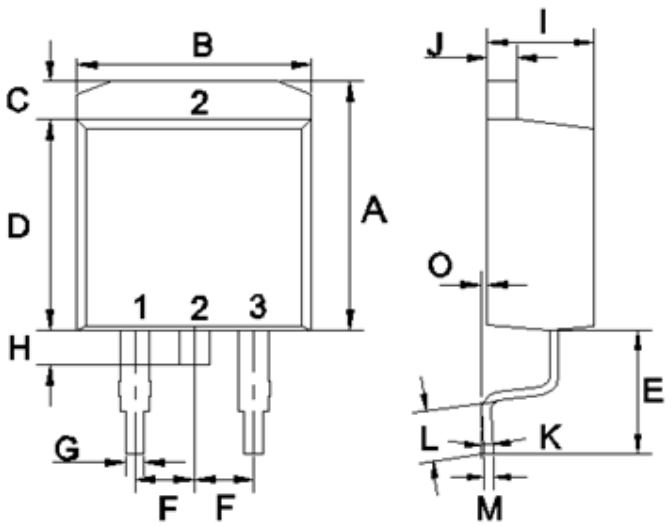
ITO-220AB Unit:mm		
DIM	MIN	MAX
A	14.50	15.50
B	9.50	10.50
C	2.50	2.90
D	6.30	7.30
E	3.30	4.30
F	13.00	14.00
G	2.35	2.75
H	0.30	0.90
I	0.90	1.50
J	3.20	3.80
K	4.24	4.84
L	2.52	2.92
M	1.09	1.49
N	0.47	0.64

TO-262 Mechanical Drawing



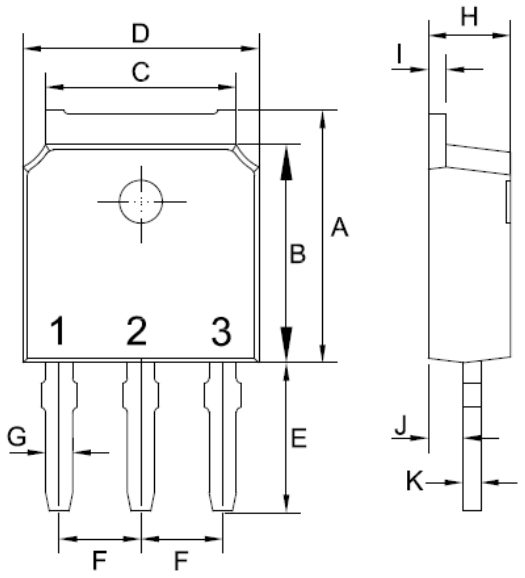
TO-262(I²PAK) Unit:mm		
DIM	MIN	MAX
A	10.14	11.14
B	9.57	10.57
C	1.44	1.84
D	2.95	3.95
E	12.70	13.40
F	2.34	2.74
G	0.51	1.11
H	0.97	1.57
I	4.27	4.87
J	1.07	1.47
K	2.03	2.92
L	0.30	0.46

TO-263 Mechanical Drawing



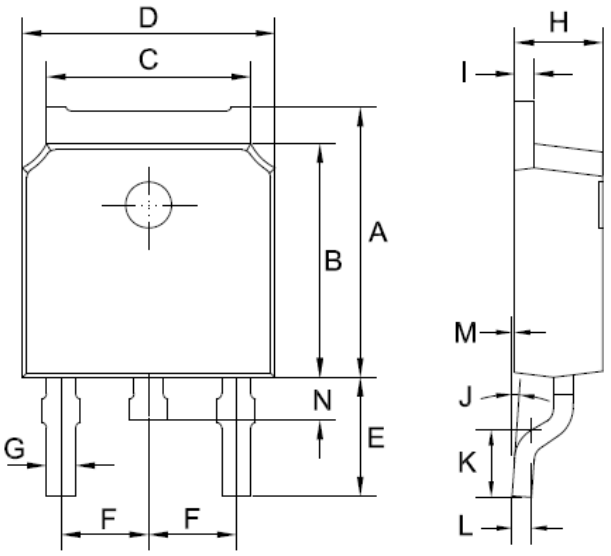
TO-263 (D² PAK) Unit:mm		
DIM	MIN	MAX
A	10.44	10.84
B	9.81	10.21
C	1.44	1.84
D	8.80	9.20
E	4.46	4.66
F	2.44	2.64
G	0.61	1.01
H	0.70	1.30
I	4.27	4.87
J	1.07	1.47
K	0°	8°
L	2.10	2.50
M	0.30	0.46
O	0	0.25

TO-251 Mechanical Drawing



TO-251 (IPAK) Unit:mm		
DIM	MIN	MAX
A	6.85	7.25
B	5.90	6.30
C	5.13	5.53
D	6.40	6.80
E	3.95	4.35
F	2.19	2.39
G	0.45	0.85
H	2.20	2.40
I	0.41	0.61
J	0.71	1.31
K	0.41	0.61

TO-252 Mechanical Drawing



TO-252 (DPAK) Unit:mm		
DIM	MIN	MAX
A	6.85	7.25
B	5.90	6.30
C	5.13	5.53
D	6.40	6.80
E	2.90	3.30
F	2.19	2.39
G	0.45	0.85
H	2.20	2.40
I	0.41	0.61
J	0°	8°
K	1.45	1.85
L	0.41	0.61
M	0.00	0.12
N	0.60	1.00

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