YEA SHIN TECHNOLOGY CO., LTD

YS4N65

N-Channel Enhancement MOSFET

VDS= 650V, ID= 4A

Feature

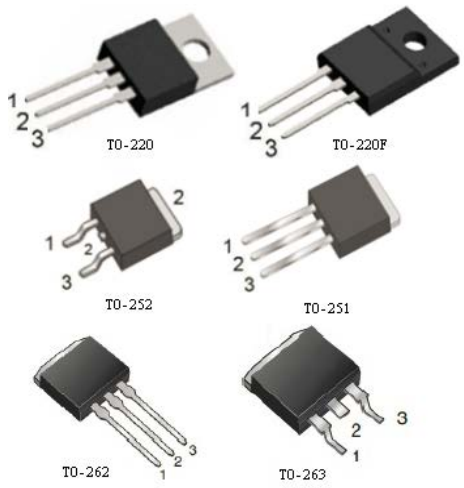
- $R_{DS(ON)}$<2.4Ω @ V_{GS}=10V
- Fast switching capability
- Lead free in compliance with EU RoHS directive.
- Green molding compound

Mechanical Data

- Case : TO-251, TO-252, TO-220, TO-220F, TO-262, TO-263

PRODUCT SUMMARY

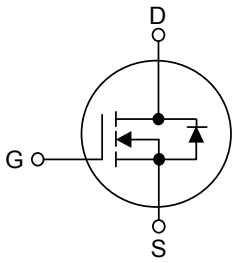
V_{DS} (V)	$R_{DS(on)}$(Ω)	I_D (A)
650	2.4 @ V_{GS}=10V	4



Pin Definition:

1. Gate
2. Drain
3. Source

Block Diagram



Ordering Information

Part No.	Package	Packing
YS4N65R-TU	TO-251	75pcs / Tube
YS4N65D-TR	TO-252	2.5Kpcs / 13” Reel
YS4N65D-TU	TO-252	75pcs / Tube
YS4N65P-TU	TO-220	50pcs / Tube
YS4N65F-TU	TO-220F	50pcs / Tube
YS4N65J-TU	TO-262	50pcs / Tube
YS4N65H-TU	TO-263	50pcs / Tube
YS4N65H-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	4	A
Pulsed Drain Current (Note 2)		I_{DM}	16	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	260	mJ
Power Dissipation	TO-251 / TO-252	P_D	50	W
	TO-220F		35	
	TO-220 / TO-262 / TO-263		106	
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 maximum junction temperature

3. L = 30mH, I_{AS} = 3.6A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C

DEVICE CHARACTERISTICS

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THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220 / TO-220F TO-262 / TO-263	θ_{JA}	62.5	°C/W
	TO-251/ TO-252		110	
Junction to Case	TO-220 / TO-220F TO-262 / TO-263	θ_{JC}	2.35	°C/W
	TO-220F		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_{GS} = 30V, V_{DS} = 0V			100	nA
	Reverse		V_{GS} = -30V, V_{DS} = 0V			-100	nA
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 = 2A		2.0	2.4	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz		670		pF
Output Capacitance		C_{OSS}			70		pF
Reverse Transfer Capacitance		C_{RSS}			23		pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		$t_{D(ON)}$	V_{DD} = 325V, I_D =4.0A, R_G = 25Ω (Note 1, 2)		45		ns
Turn-On Rise Time		t_R			100		ns
Turn-Off Delay Time		$t_{D(OFF)}$			200		ns
Turn-Off Fall Time		t_F			130		ns
Total Gate Charge		Q_G	V_{DS}= 520V,I_D= 4.0A, V_{GS}= 10V (Note 1, 2)		100		nC
Gate-Source Charge		Q_{GS}			17		nC
Gate-Drain Charge		Q_{GD}			20		nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}= 0V, I_S = 4A			1.4	V
Maximum Continuous Drain-Source Diode Forward Current		I_S				4	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				16	A
Reverse Recovery Time		t_{rr}	V_{GS} = 0 V, I_S = 4A, dI_F/dt = 100 A/ μs (Note 1)		260		ns
Reverse Recovery Charge		Q_{RR}			2.5		μC

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

2. Essentially independent of operating temperature

DEVICE CHARACTERISTICS

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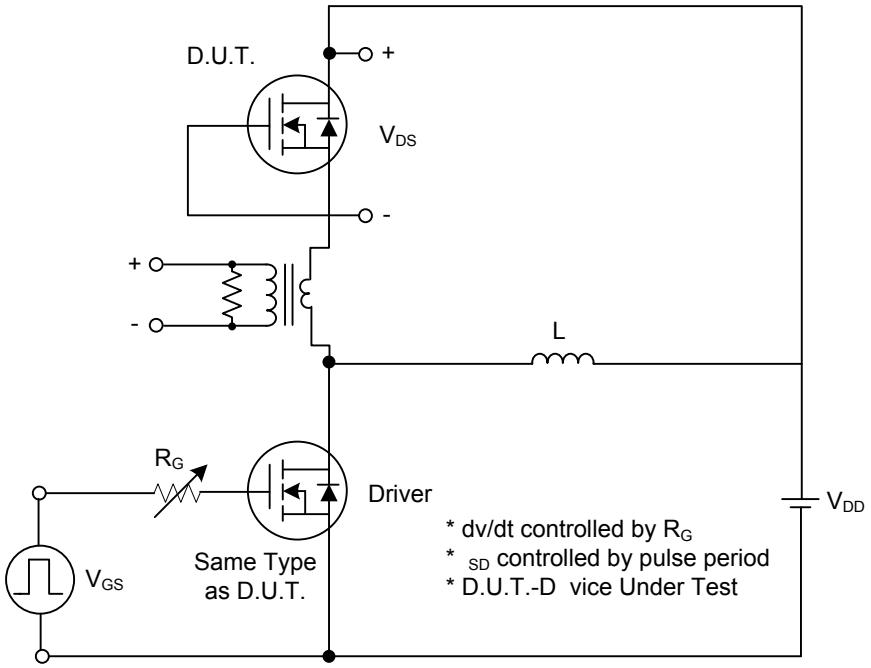
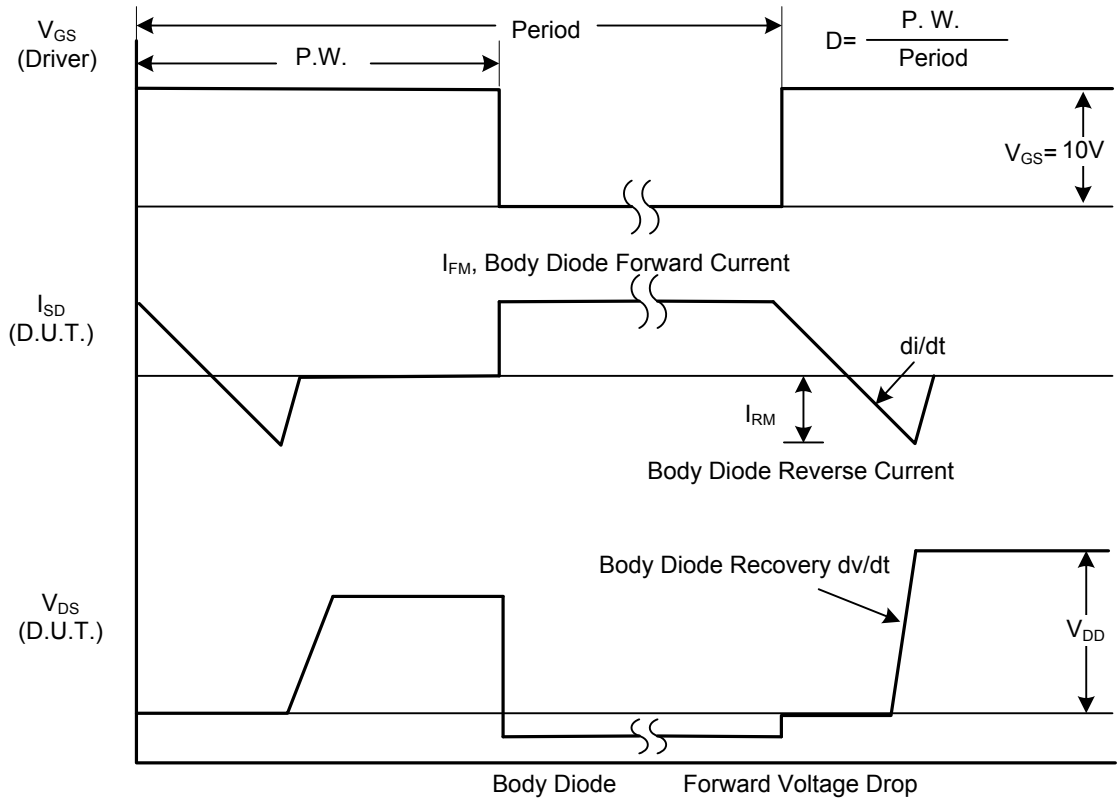
TEST CIRCUITS AND WAVEFORMS

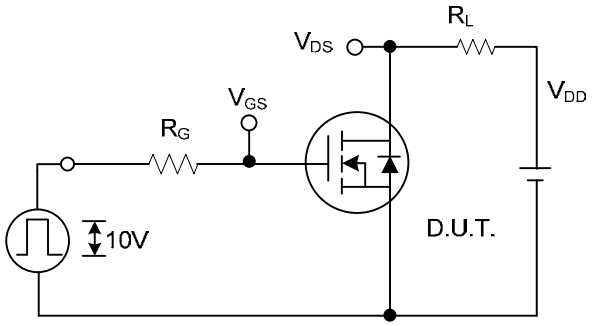


Peak Diode Recovery dv/dt Test Circuit

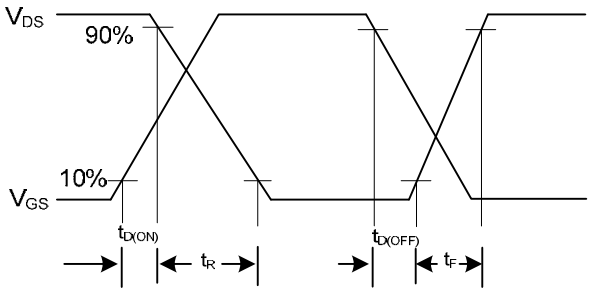


Peak Diode Recovery dv/dt Waveforms

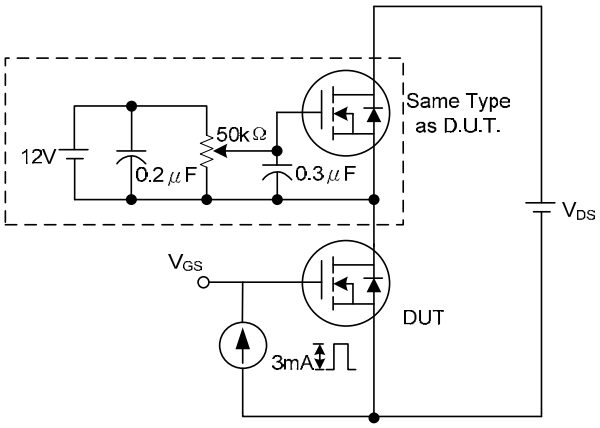
TEST CIRCUITS AND WAVEFORMS(Cont.)



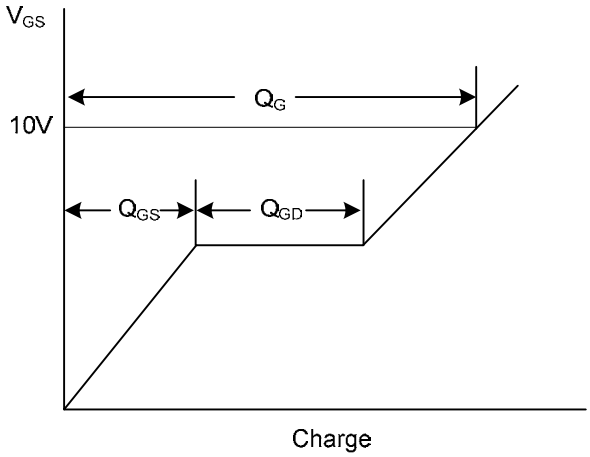
Switching Test Circuit



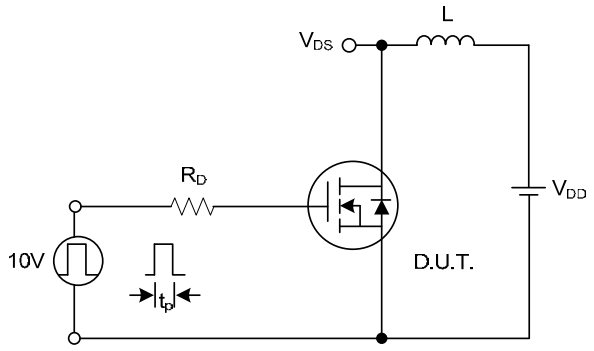
Switching Waveforms



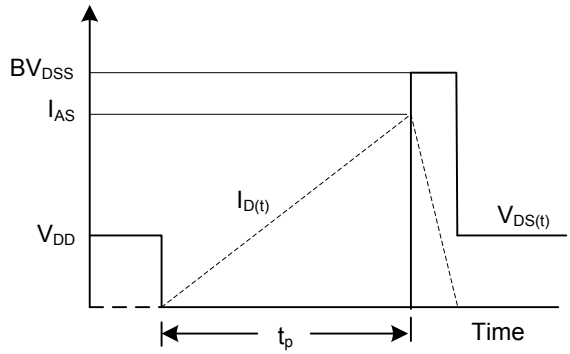
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

DEVICE CHARACTERISTICS

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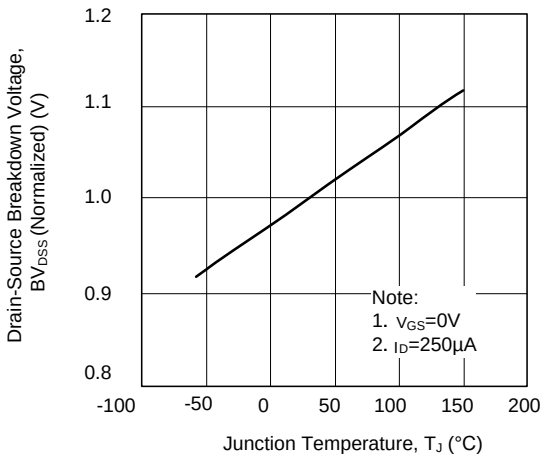
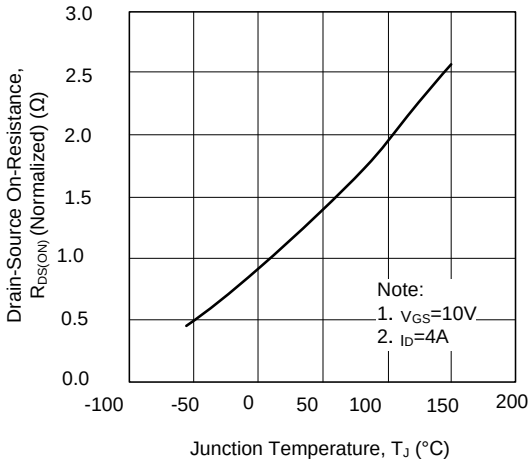
TYPICAL CHARACTERISTICS

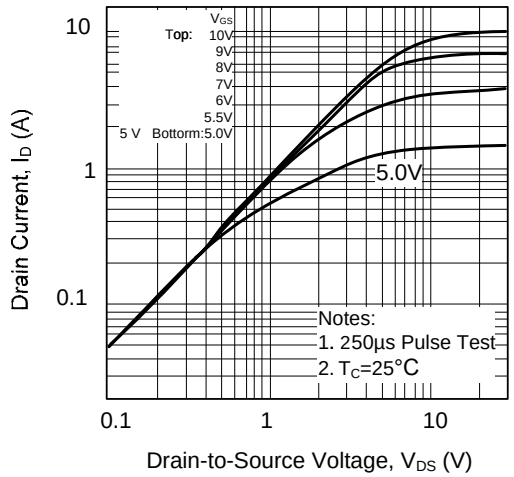
Breakdown Voltage Variation vs. Temperature



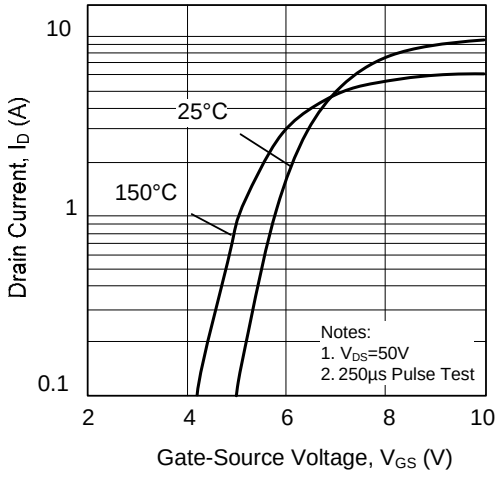
On-Resistance Junction Temperature



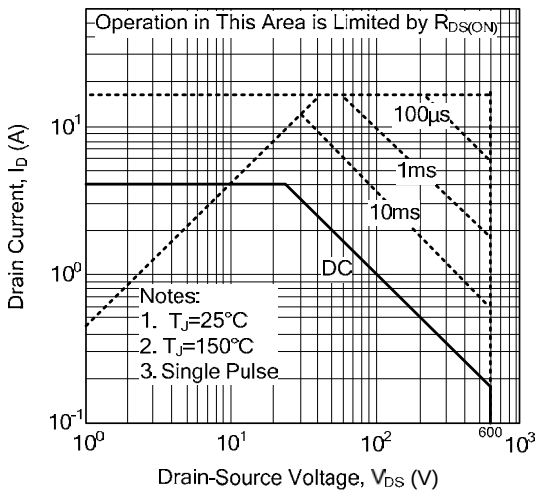
On-State Characteristics



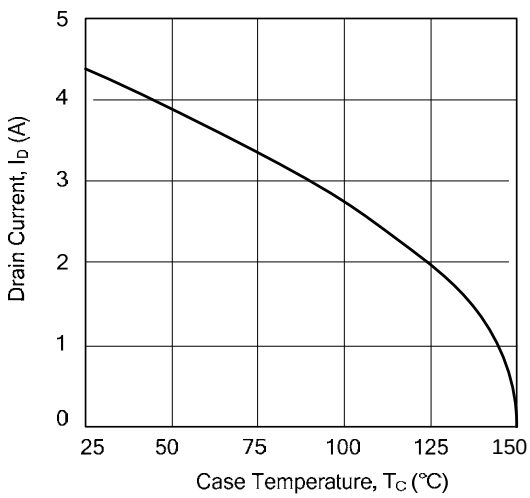
Transfer Characteristics



Safe Operating Area



Maximum Drain Current vs. Case Temperature



DEVICE CHARACTERISTICS

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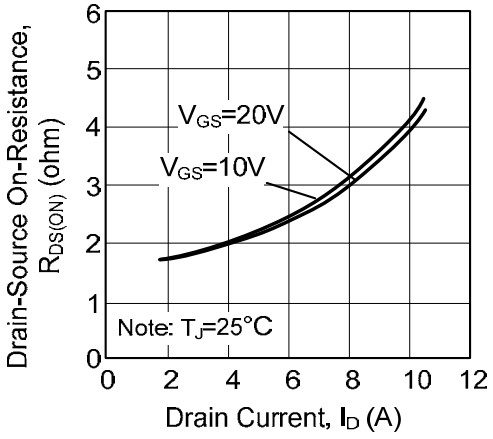
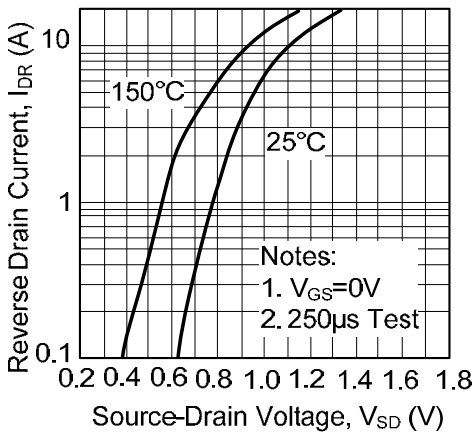
TYPICAL CHARACTERISTICS

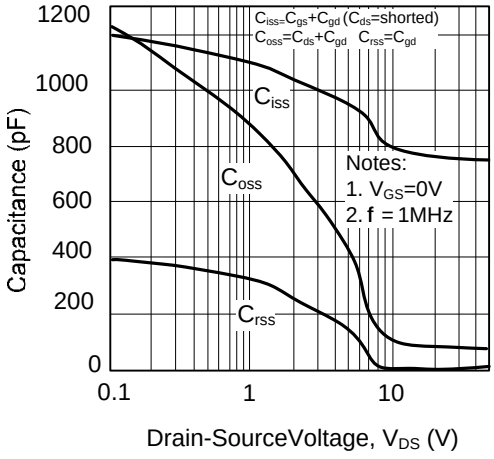
On-Resistance Variation vs. Drain Current and Gate Voltage



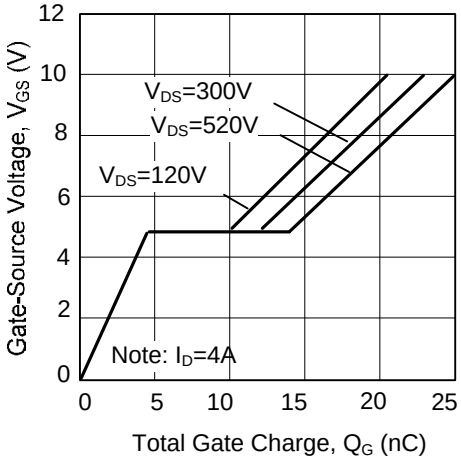
On State Current vs. Allowable Case Temperature



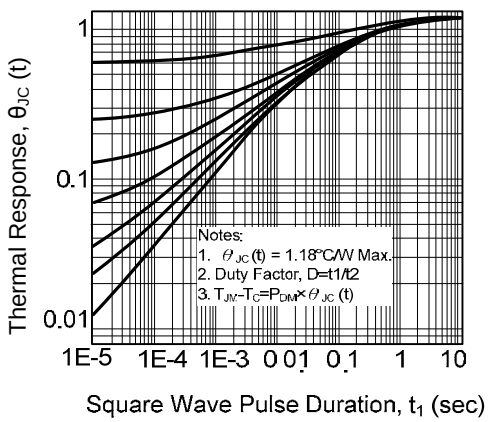
Capacitance Characteristics (Non-Repetitive)



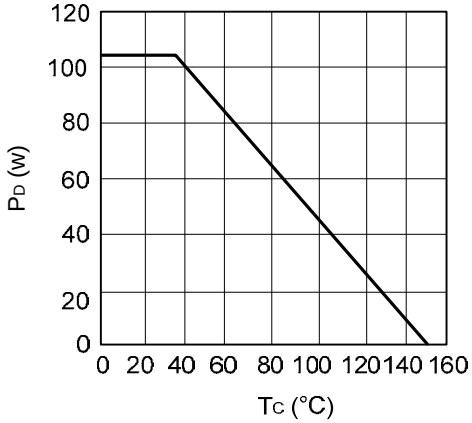
Gate Charge Characteristics



Transient Thermal Response Curve



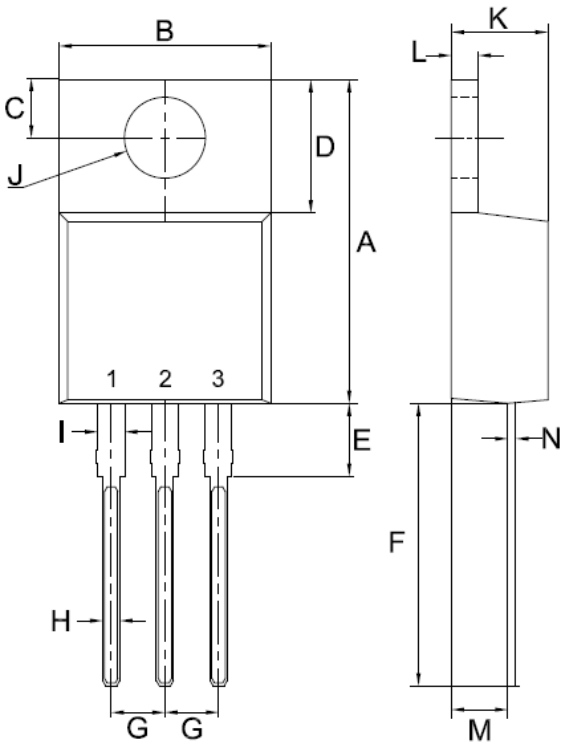
Power Dissipation



PACKAGE OUTLINE & DIMENSIONS

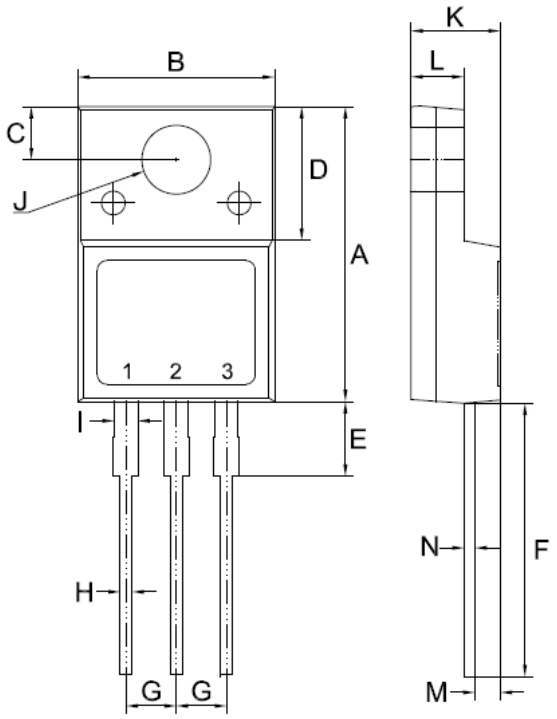
YS4N65

TO-220 Mechanical Drawing



TO-220 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

TO-220F Mechanical Drawing

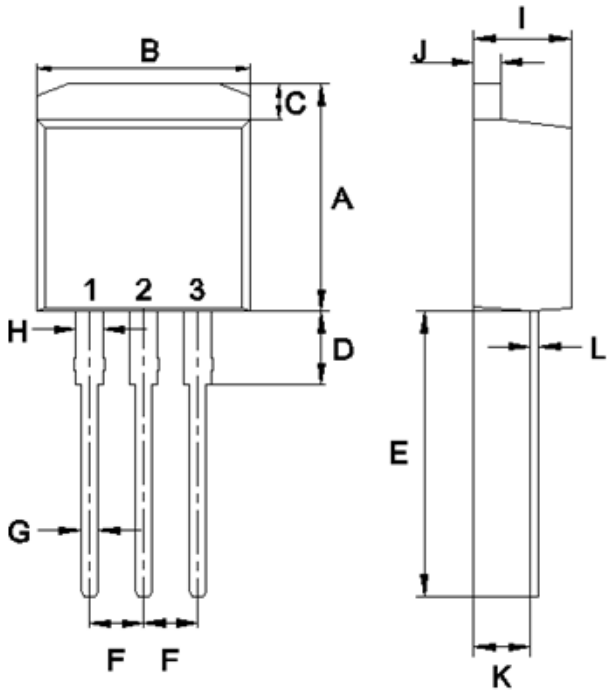


TO-220F Unit:mm		
DIM	MIN	MAX
A	14.50	15.50
B	9.50	10.50
C	2.50	2.90
D	6.30	7.30
E	3.30	4.30
F	13.00	14.00
G	2.35	2.75
H	0.30	0.90
I	0.90	1.50
J	3.20	3.80
K	4.24	4.84
L	2.52	2.92
M	1.09	1.49
N	0.47	0.64

PACKAGE OUTLINE & DIMENSIONS

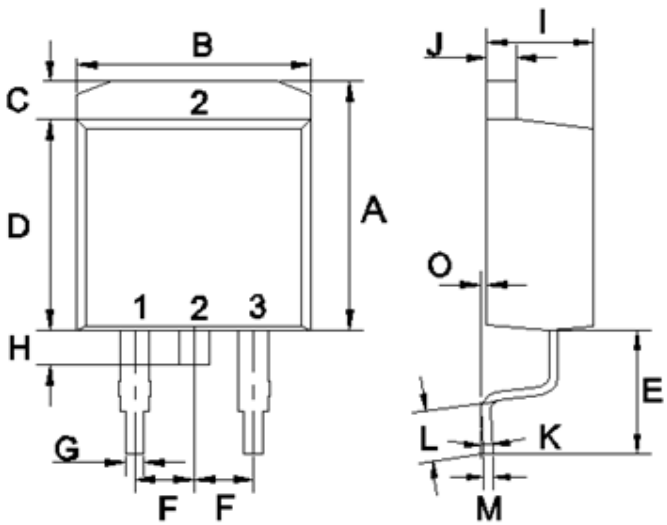
YS4N65

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

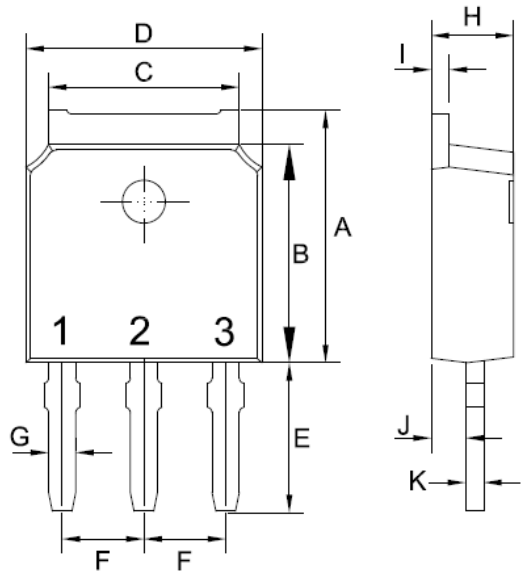


TO-263 (D² PAK) Unit:mm		
DIM	MIN	MAX
A	10.44	10.84
B	9.81	10.21
C	1.44	1.84
D	8.80	9.20
E	4.46	4.66
F	2.44	2.64
G	0.61	1.01
H	0.70	1.30
I	4.27	4.87
J	1.07	1.47
K	0°	8°
L	2.10	2.50
M	0.30	0.46
O	0	0.25

PACKAGE OUTLINE & DIMENSIONS

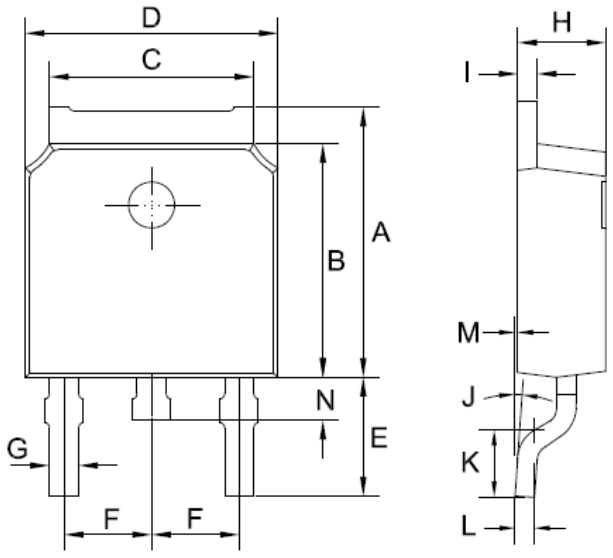
YS4N65

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