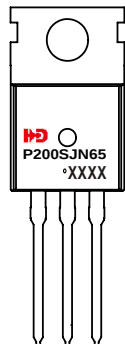


N-Channel Super Junction Power MOSFET

Features:

- ☐ Super Junction technology
- ☐ Much lower $R_{on} \cdot A$ Performance for On-state efficiency
- ☐ Better efficiency due to very low FOM
- ☐ Ultra Low Gate Charge: $Q_g = 40.5\text{nC}$ (Typ.)
- ☐ $V_{DS} = 650\text{V}$, $I_D = 20\text{A}$
- ☐ $R_{ds(on)}: 167\text{m}\Omega$ (Typ.) @ $V_G = 10\text{V}$
- ☐ 100% Avalanche Tested

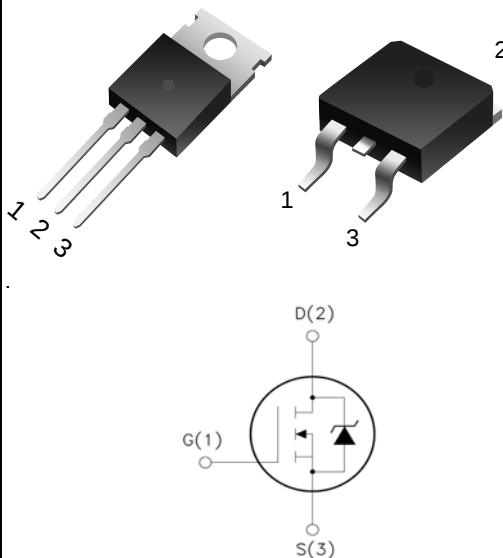
MARKING



P200SJN65 Device code.
Solid dot = Green molding compound device,
if none, the normal device.
XXXX = Code.

TO-220

TO-263



- 1. Gate (G)
- 2. Drain (D)
- 3. Source (S)

Absolute Maximum Ratings (Ta=25°C unless otherwise noted)

Symbol	Parameter		Value	Unit
V_{DS}	Drain-Source Voltage		650	V
I_D	Drain Current	$T_C = 25^\circ\text{C}$	20	A
		$T_C = 100^\circ\text{C}$	12	
$V_{GS(TH)}$	Gate Threshold Voltage		± 30	V
E_{AS}	Single Pulse Avalanche Energy		210	mJ
I_{DM}	Drain Current-Pulsed		80	A
P_D	Power Dissipation ($T_j = 25^\circ\text{C}$)		180	W
T_j	Junction Temperature(MAX)		$-55 \sim +150$	$^\circ\text{C}$
T_{stg}	Storage Temperature		$-55 \sim +150$	$^\circ\text{C}$
TL	Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds		300	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	-	0.7	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	62.5	$^\circ\text{C/W}$

Electrical Characteristic (at $T_j = 25^\circ\text{C}$, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristic						
Drain-source breakdown voltage	BV_{DSS}	650	-	-	V	$V_{GS}=0V, I_D=250\mu A$
Gate threshold voltage	$V_{GS(th)}$	3.4	-	4.6	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	$V_{DS}=650V, V_{GS}=0V$ $T_C=25^{\circ}C$
		-	1	-		$T_C=150^{\circ}C$
Gate-source leakage current	I_{GSS}	-	0.5	100	nA	$V_{GS}=\pm 30V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	167	200	m Ω	$V_{GS}=10V, I_D=10A,$ $T_C=25^{\circ}C$
		-	330	-		$T_C=150^{\circ}C$
Transconductance	g_{fs}	-	17	-	S	$V_{DS}=20V, I_D=10A$

Dynamic Characteristic

Input Capacitance	C_{iss}	-	1374	-	pF	$V_{GS}=0V, V_{DS}=100V,$ $f=1MHz$
Output Capacitance	C_{oss}	-	68	-		
Reverse Transfer Capacitance	C_{rss}	-	0.54	-		
Gate Total Charge	Q_G	-	40.5	-	nC	$V_{GS}=10V, V_{DS}=480V,$ $I_D=10A$
Gate-Source charge	Q_{gs}	-	8.5	-		
Gate-Drain charge	Q_{gd}	-	16.9	-		
Turn-on delay time	$t_{d(on)}$	-	38	-	ns	$T_j=25^\circ C, V_{GS}=10V,$ $I_D=10A, V_{DS}=400V,$ $R_g=27\Omega$
Rise time	t_r	-	29	-		
Turn-off delay time	$t_{d(off)}$	-	185	-		
Fall time	t_f	-	24	-		
Gate resistance	R_{gint}	-	6.8	-	Ω	$f=1MHz$

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	0.6	0.85	1.1	V	$V_{GS}=0V, I_{SD}=10A$
Body Diode Reverse Recovery Time	t_{rr}	-	295	-	ns	$I_{SD}=10A$ $dI/dt=100A/\mu s, V_{DS}=40V$
Body Diode Reverse Recovery Charge	Q_{rr}	-	4316	-	μC	

Typical Performance Characteristics

Fig 1. Output Characteristics ($T_J=25^\circ\text{C}$)

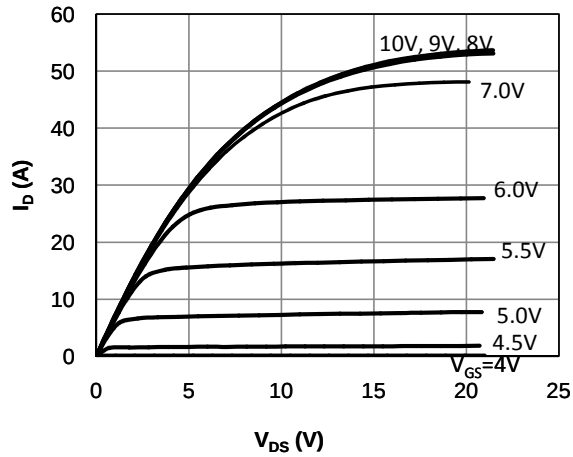


Fig 2. Output Characteristics ($T_J=150^\circ\text{C}$)

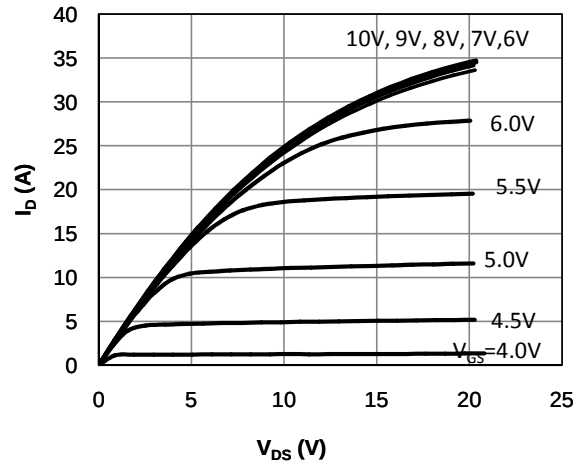


Fig 3: Transfer Characteristics

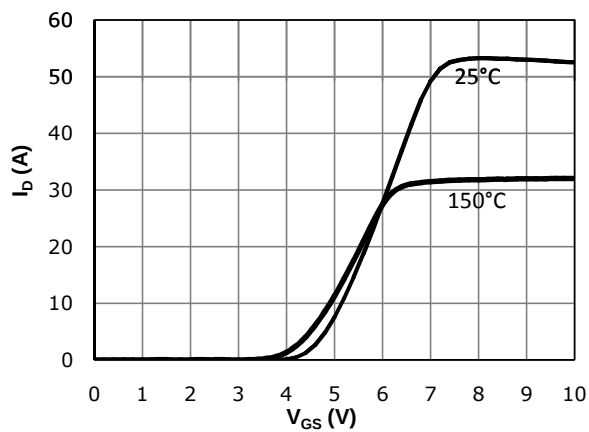


Fig 4: V_{TH} Vs T_J Temperature Characteristics

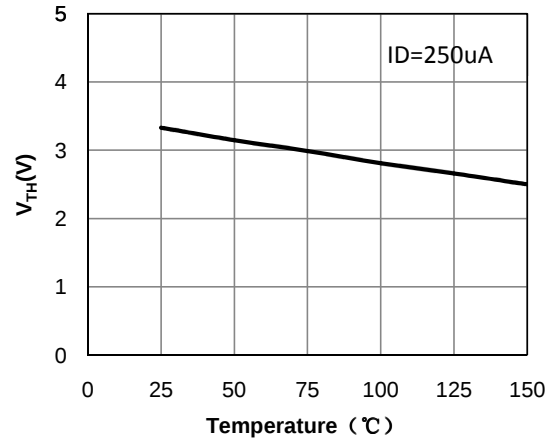


Fig 5: $R_{DS(on)}$ Vs I_{DS} Characteristics ($T_C=25^\circ\text{C}$)

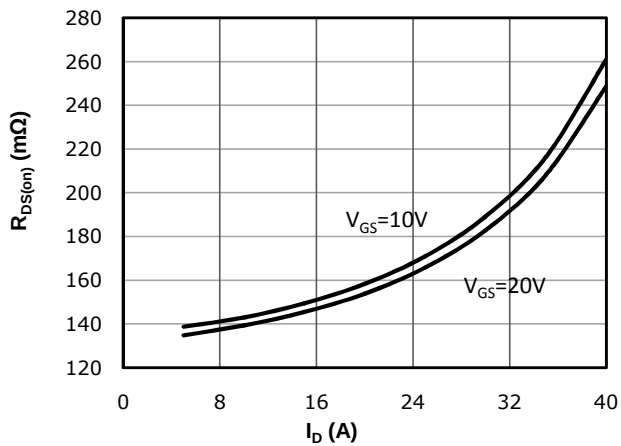
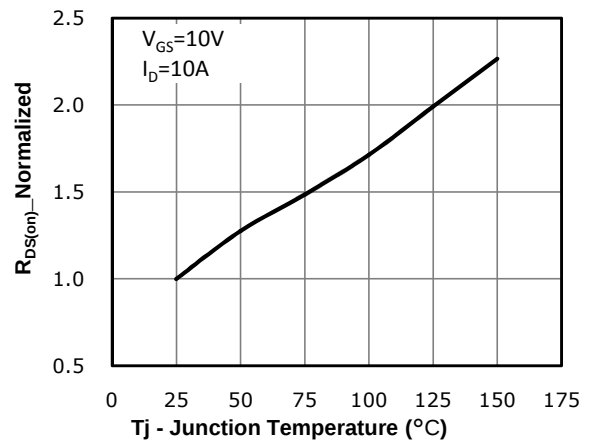


Fig 6: $R_{DS(on)}$ vs. Temperature



Typical Performance Characteristics

Fig 7: BVDSS vs. Temperature

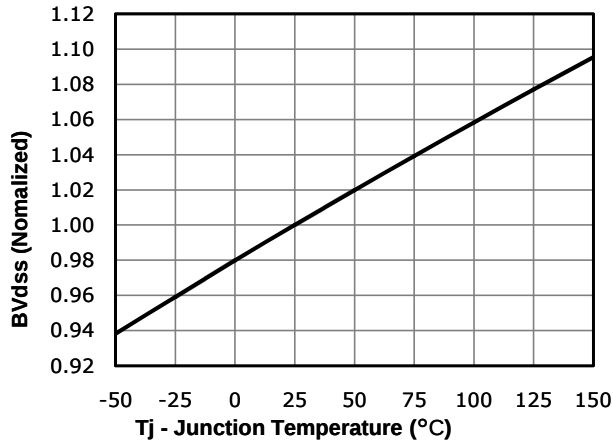


Fig 8: Rds(on) vs Gate Voltage

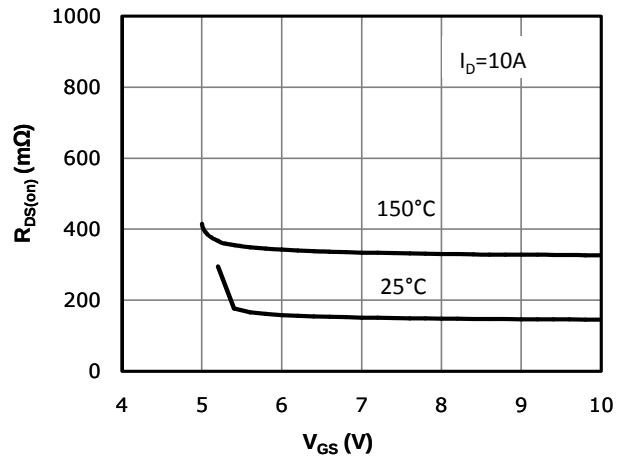


Fig 9: Body-diode Forward Characteristics

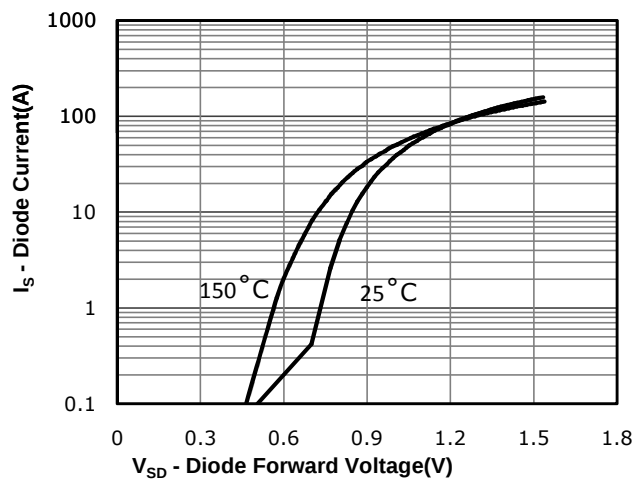


Fig 10: Gate Charge Characteristics

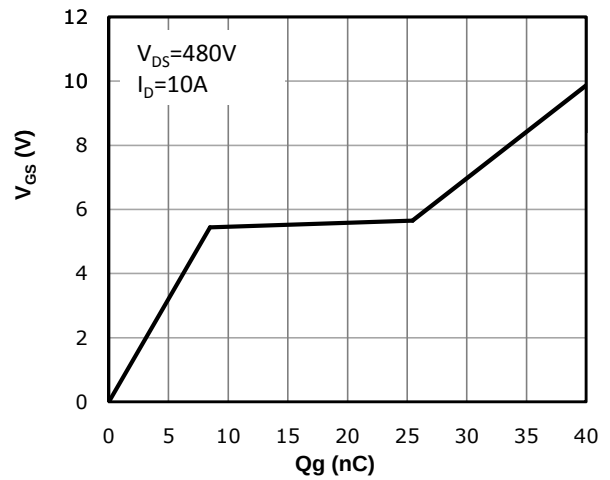


Fig 11: Capacitance Characteristics

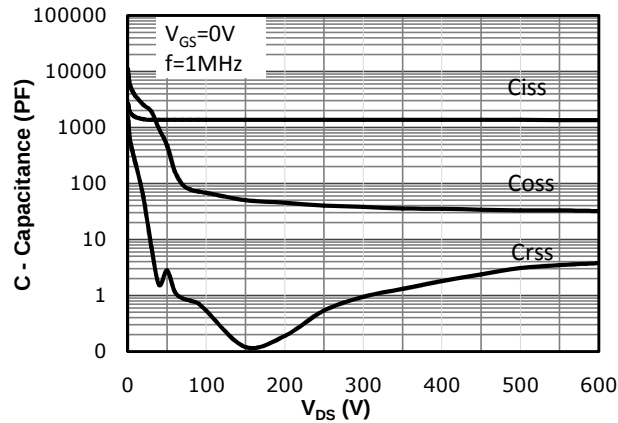
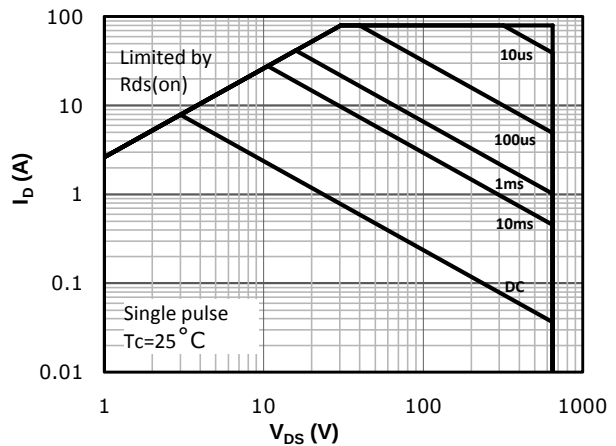
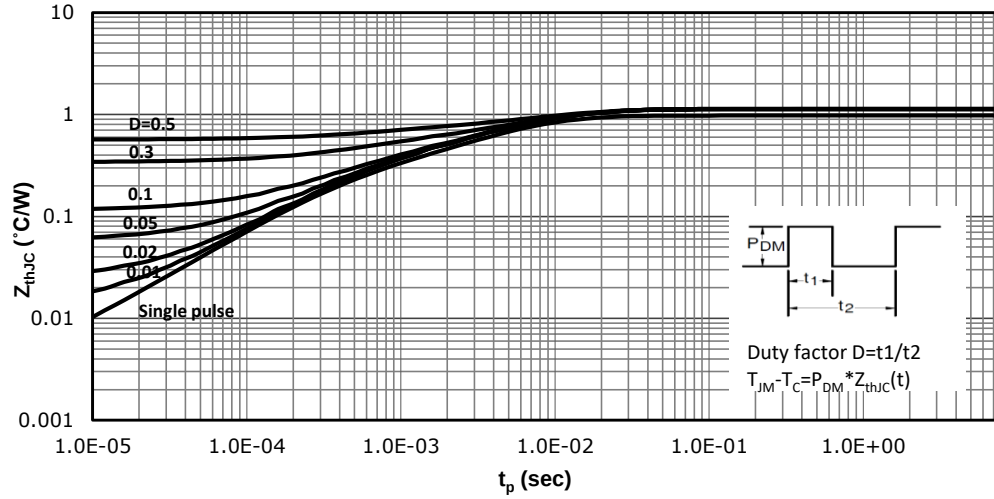


Fig 12: Safe Operating Area



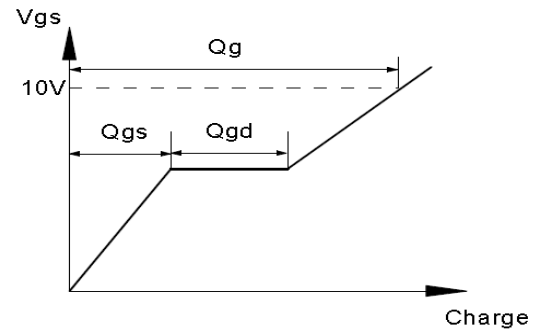
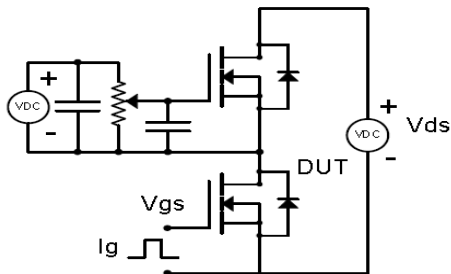
Typical Performance Characteristics

Fig 13: Max. Transient Thermal Impedance

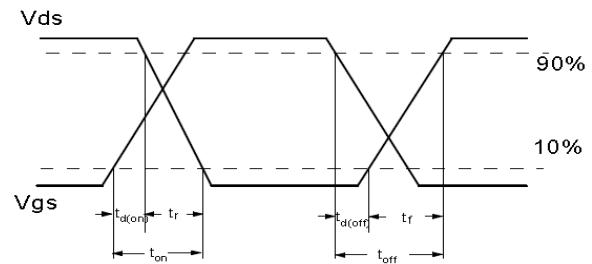
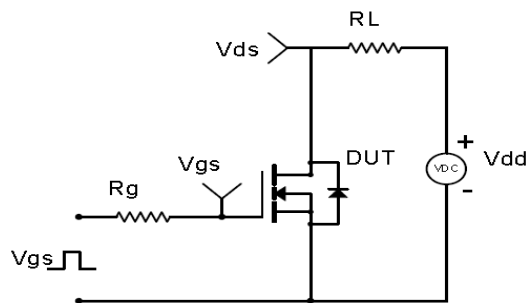


Test Circuit & Waveform

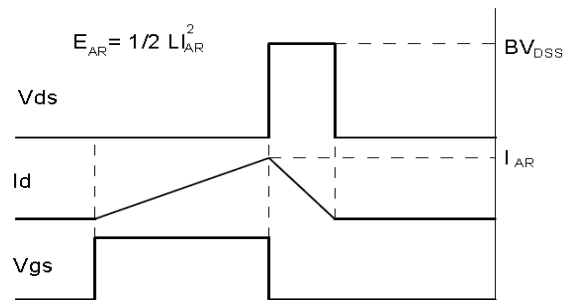
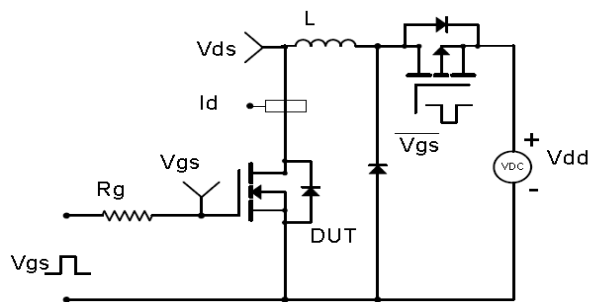
Gate Charge Test Circuit & Waveform



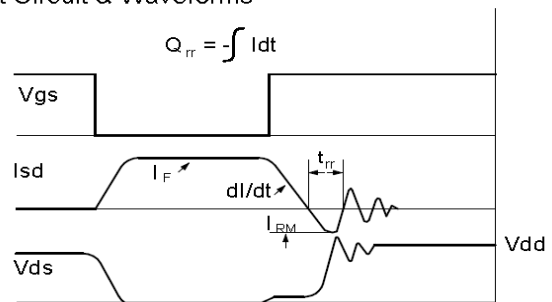
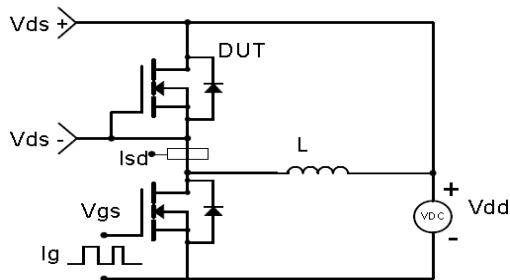
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



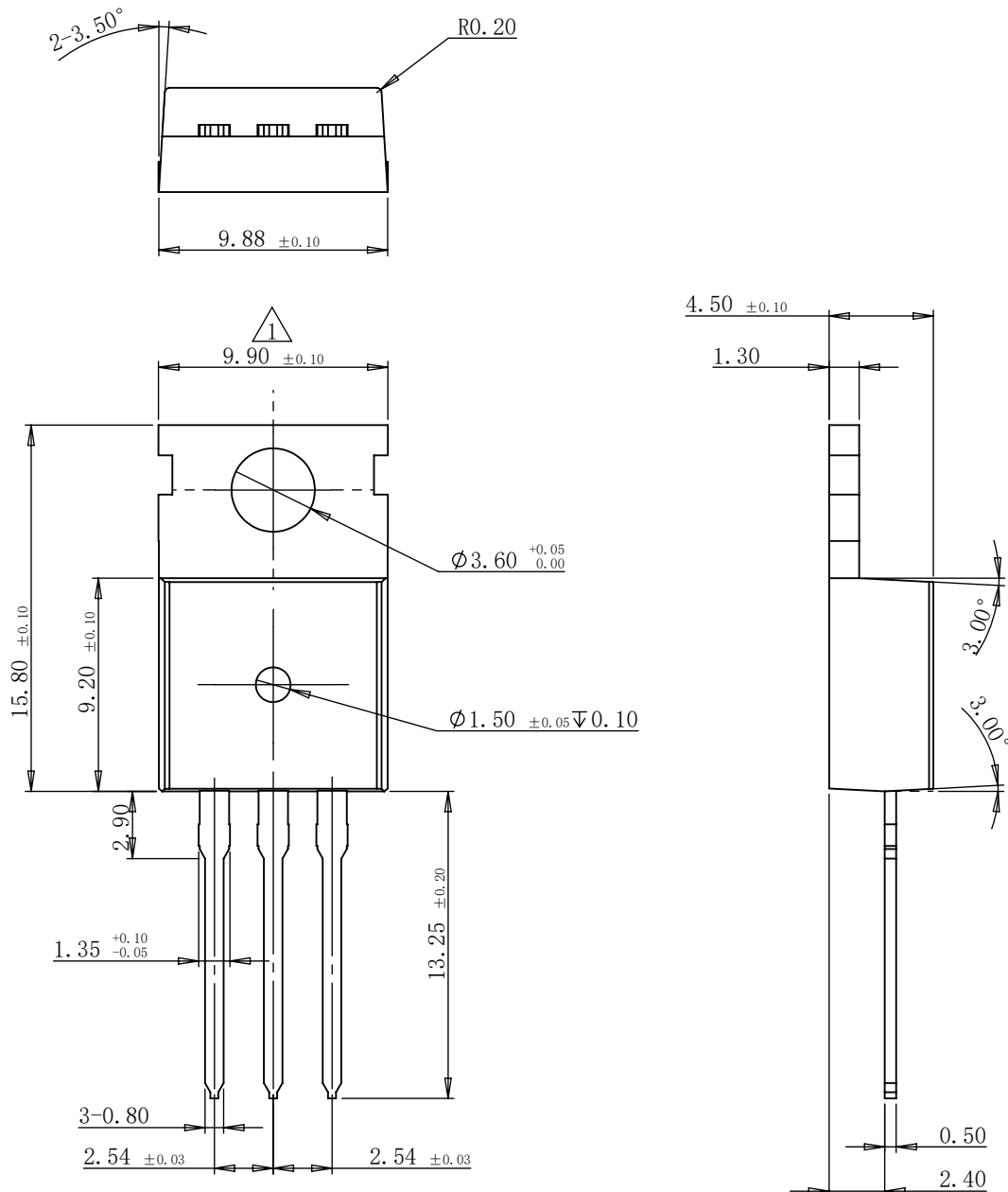
Diode Recovery Test Circuit & Waveforms



Package Dimension

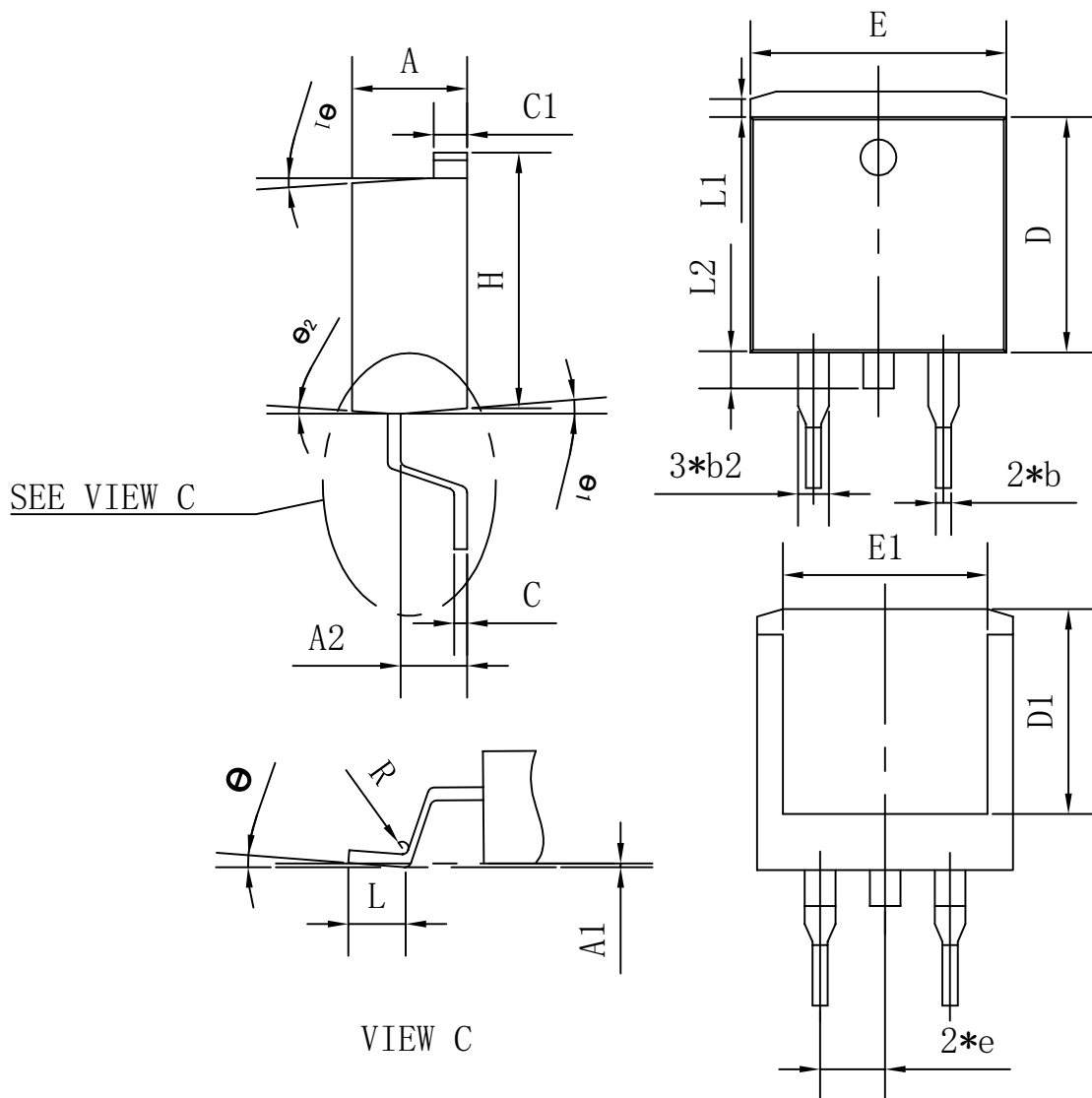
TO-220

Unit: mm



Package Dimension**TO-263**

Unit: mm



SYMBOL	MIN	NOM	MAX
A	4.35	4.47	4.60
A1	0.09	0.10	0.11
A2	2.30	2.40	2.50
b	0.70	0.80	1.00
b2	1.25	1.36	1.38
C	0.45	0.50	0.55
C1	1.29	1.30	1.31
D	9.10	9.20	9.30
D1	7.90	8.00	8.10
E	9.85	10.00	10.20
E1	7.90	8.00	8.10
H	15.30	15.50	15.70
e	—	2.54	—
L	2.34	2.54	2.74
L1	1.00	1.10	1.20
L2	1.30	1.40	1.50
R	0.24	0.25	0.26
θ	0°	4°	8°
θ_1	4°	7°	10°
θ_2	0°	3°	6°