

General Description

JMX65R190ME series is power MOSFET using advanced super junction technology that can realize very low on-resistance and gate charge. It will provide much high efficiency by using optimized charge coupling technology. It is engineered to minimize conduction loss, JMX65R190ME series is optimized for extreme switching performance to minimize switching loss. It is tailored for high power density applications to meet the highest efficiency standards.

Features

- ❖ Low $R_{DS(ON)}$ & FOM
- ❖ Low Power Loss by High Speed Switching and Low On-Resistance
- ❖ Excellent stability and uniformity

Applications

- | | |
|-----------------|----------------|
| ❖ PC power | ❖ Server power |
| ❖ LED lighting | ❖ EV Charger |
| ❖ Telecom power | ❖ Solar/UPS |

ORDERING INFORMATION

ACKAGE	TEMPERATURE RANGE	ORDERING PART NUMBER	TRANSPORT MEDIA
TO-252-2L	-55 °C to 150 °C	JMD65R190METR	Tape and Reel 2500 units
TO-263-2L	-55 °C to 150 °C	JMB65R190METR	Tape and Reel 800 units
TO-220F	-55 °C to 150 °C	JMF65R190METH	Tape 1000 units
TO-220	-55 °C to 150 °C	JMA65R190METH	Tape 1000 units

Package & Pin Information



Absolute Maximum Ratings at $T_J=25^{\circ}\text{C}$ unless otherwise noted

Parameter	Symbol	Value	Unit	
Drain-source voltage	V _{DS}	650	V	
Gate-source voltage	V _{GS}	±30	V	
Continuous drain current ¹⁾ , T _C =25 °C	I _D	20	A	
Continuous drain current ¹⁾ , T _C =100 °C		10.5		
Pulsed drain current ²⁾ , T _C =25 °C	I _{D, pulse}	62	A	
Continuous diode forward current ¹⁾ , T _C =25 °C	I _S	20	A	
Diode pulsed current ²⁾ , T _C =25 °C	I _{S, pulse}	62	A	
Power dissipation ³⁾ , T _C =25 °C	PTO-252-2L	PD	102	W
Power dissipation ³⁾ , T _C =25 °C	TO-263-2L	PD	115	W
Power dissipation ³⁾ , T _C =25 °C	TO-220F	PD	39	W
Power dissipation ³⁾ , T _C =25 °C	TO-220P	PD	42	W
Single pulsed avalanche energy ⁵⁾	E _{AS}	300	mJ	
MOSFET dv/dt ruggedness, V _{DS} =0...480 V	dv/dt	50	V/ns	

Reverse diode dv/dt, VDS=0...480 V, ISD≤ID	dv/dt	15	V/ns
Operation and storage temperature	Tstg, Tj	-55 to 150	°C

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-case PTO252-2	R θ JC	0.9	°C/W
Thermal resistance, junction-case TO220F	R θ JC	3.4	°C/W
Thermal resistance, junction-case TO263-2	R θ JC	0.88	°C/W
Thermal resistance, junction-case TO220P	R θ JC	0.85	°C/W
Thermal resistance, junction-ambient ⁴⁾	R θ JA	62	°C/W

Electrical Characteristics at Tj=25°C unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	BVDSS	650			V	VGS=0 V, ID=250 μ A
Gate threshold voltage	VGS(th)	2.5		3.9	V	VDS=VGS, ID=250 μ A
Drain-source on- state resistance	RDS(ON)		0.17	0.19	Ω	VGS=10 V, ID=10 A
Gate-source leakage Current	IGSS			100	nA	VGS=30 V
				-100		VGS=-30 V
Drain-source leakage Current	IDSS			1	μ A	VDS=650 V, VGS=0 V

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	Ciss		1280		pF	VGS=0 V, VDS=400 V, f=1M KHz
Output capacitance	Coss		30		pF	
Reverse transfer capacitance	Crss		9.1		pF	
Turn-on delay time	td(on)		32		ns	VGS=10 V, VDS=400 V, RG=2 Ω , ID=10 A
Rise time	tr		65		ns	
Turn-off delay time	td(off)		98		ns	
Fall time	tf		62		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Qg		29.0		nC	VGS=10 V, VDS=400 V, ID=10 A
Gate-source charge	Qgs		8.5		nC	
Gate-drain charge	Qgd		10.0		nC	
Gate plateau voltage	Vplateau		5.2		V	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	VSD			1.4	V	IS=20 A, VGS=0 V
Reverse recovery time	trr		345		ns	VR=400 V, IS=10 A, di/dt=100 A/ μ s
Reverse recovery charge	Qrr		8.6		μ C	
Peak reverse recovery current	Irrm		23.7		A	

Note

- 1) Calculated continuous current based on maximum allowable junction temperature.
- 2) Repetitive rating; pulse width limited by max. junction temperature.
- 3) Pd is based on max. junction temperature, using junction-case thermal resistance.
- 4) The value of R θ JA is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with Ta=25 °C.
- 5) VDD=100 V, VGS=10 V, L=80 mH, starting Tj=25 °C.

Electrical Characteristics Diagrams

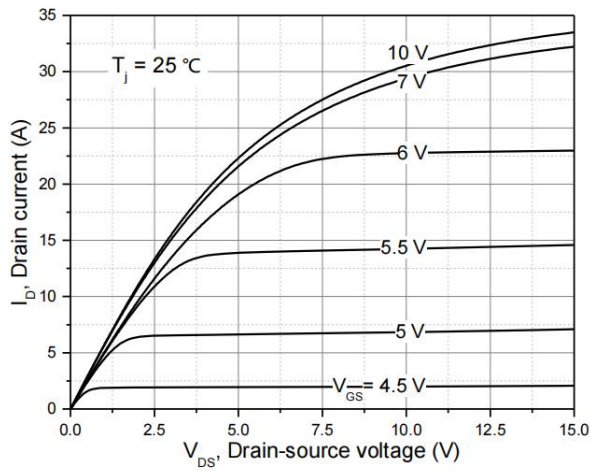


Figure 1. Typ. output characteristics

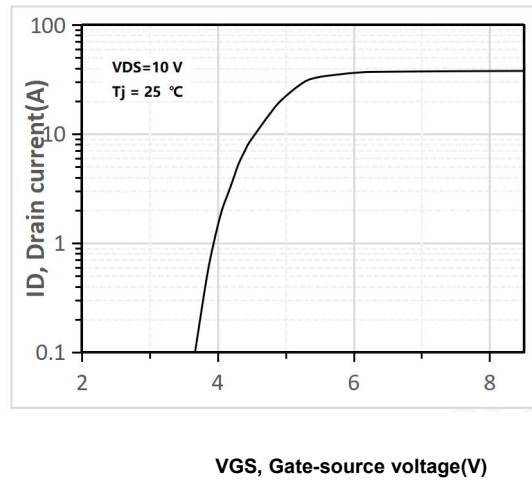


Figure 2. Typ. transfer characteristics

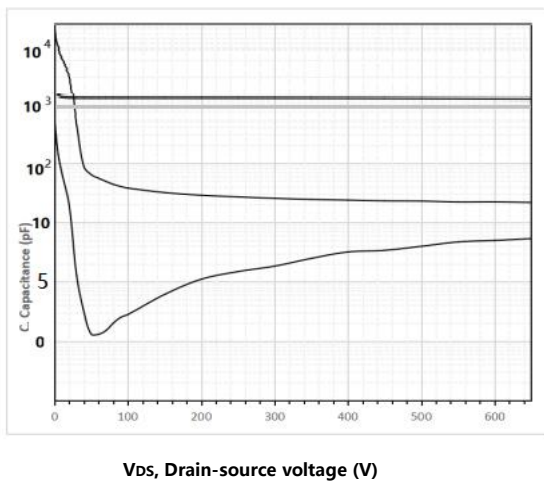


Figure 3. Typ. capacitances

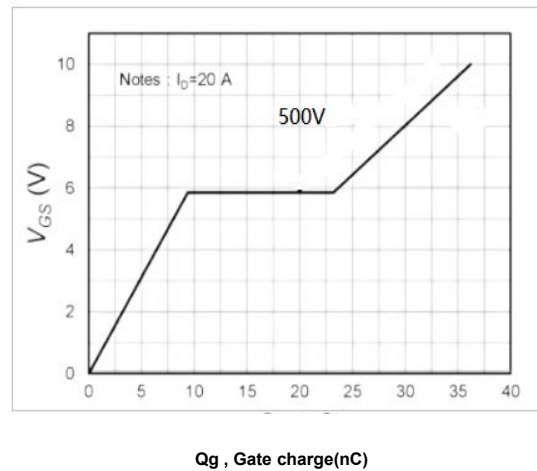


Figure 4. Typ. gate charge

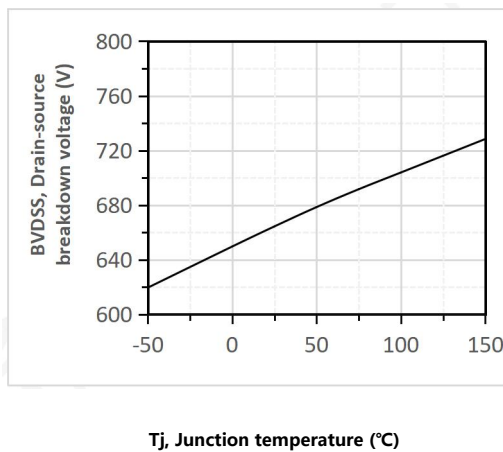


Figure 5. Drain-source breakdown voltage

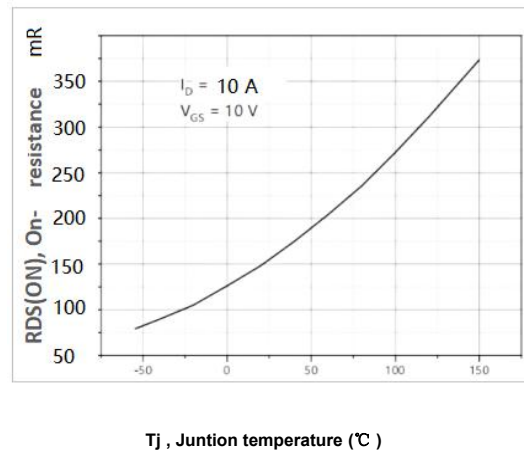
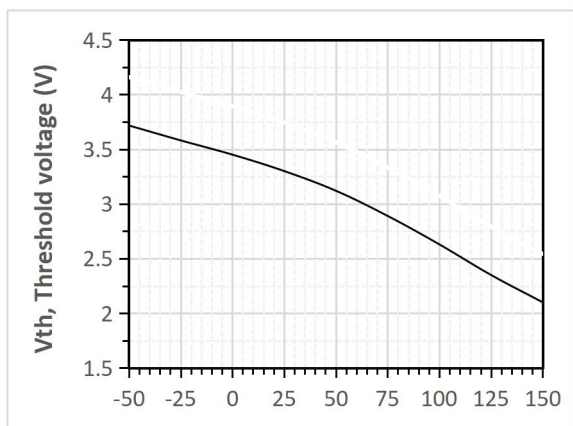
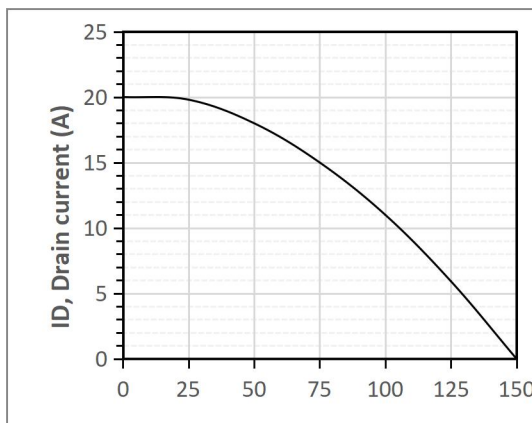


Figure 6. Drain-source on-state resistance



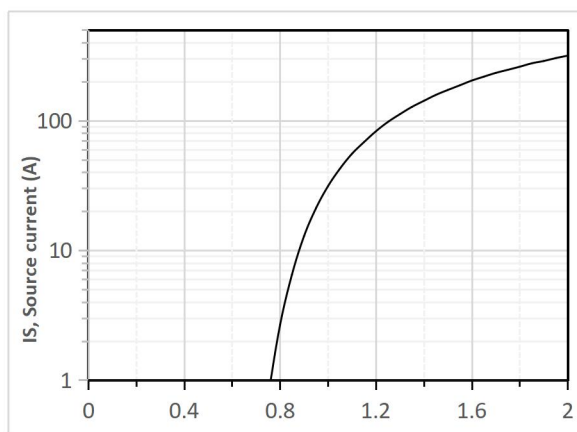
Tj, Junction Temperature (°C)

Figure 7. Threshold voltage



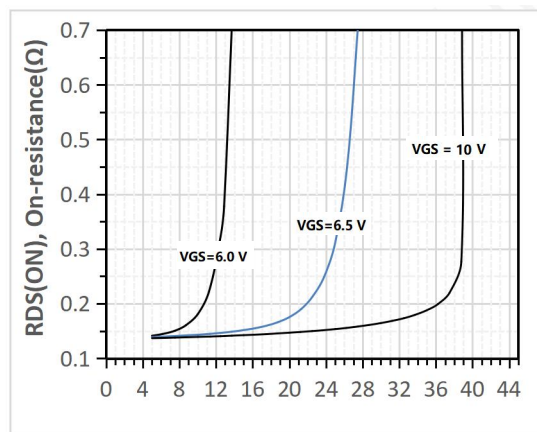
Tc, Case Temperature (°C)

Figure 8. Drain current



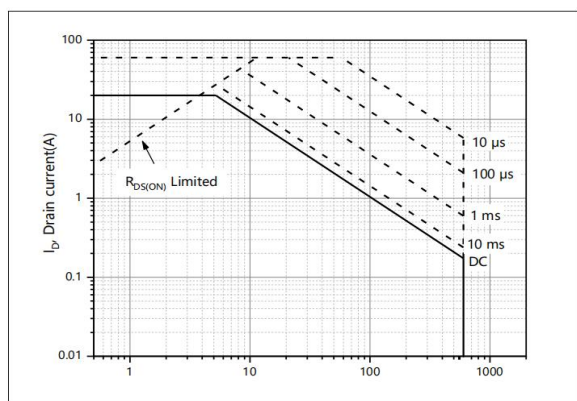
VSD, Source-Drain voltage (V)

Figure 9. Forward characteristic of body diode



ID, Drain current(A)

Figure 10. Drain-source on-state resistance



VDS, Drain-source voltage(V)

Figure 11. Safe operation area Tc=25 °C

Test circuits and waveforms

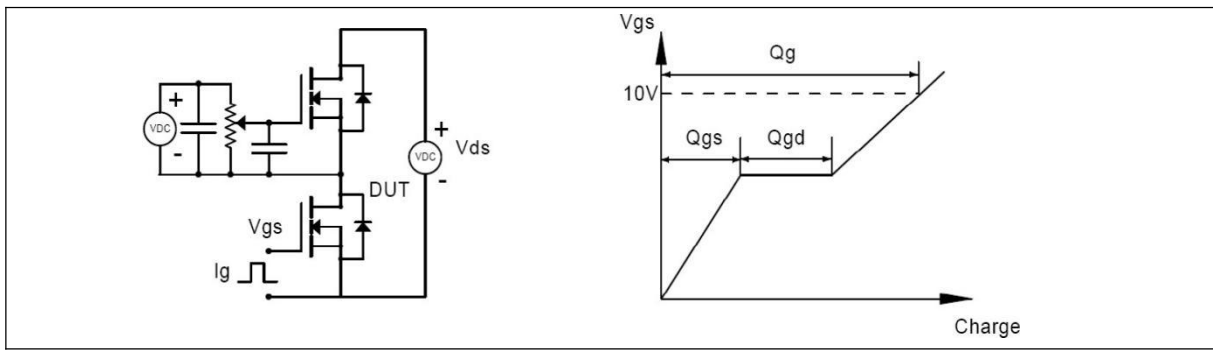


Figure 1. Gate charge test circuit & waveform

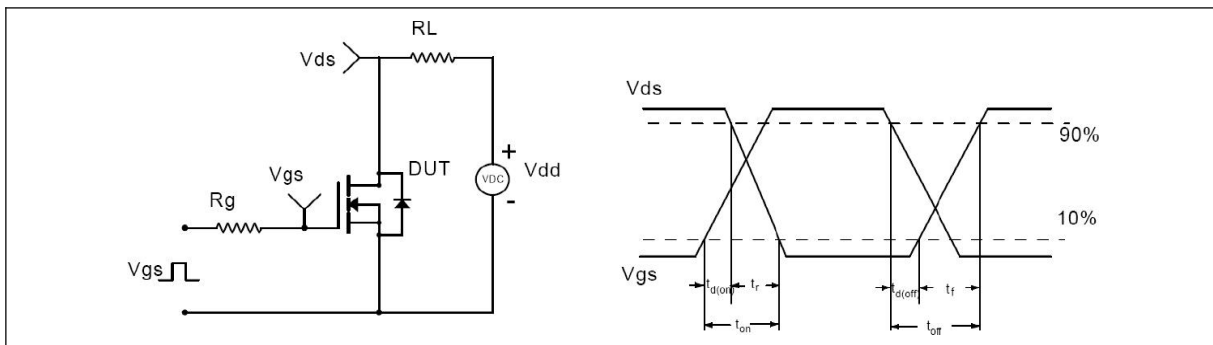


Figure 2. Switching time test circuit & waveforms

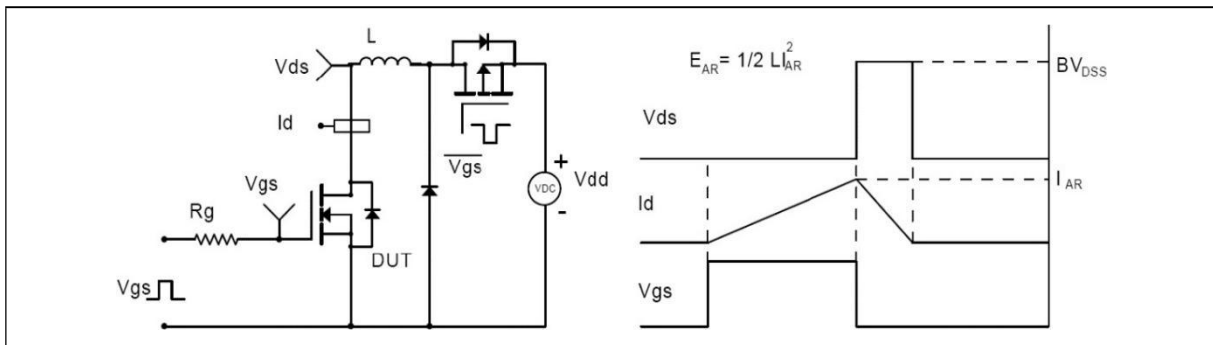


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

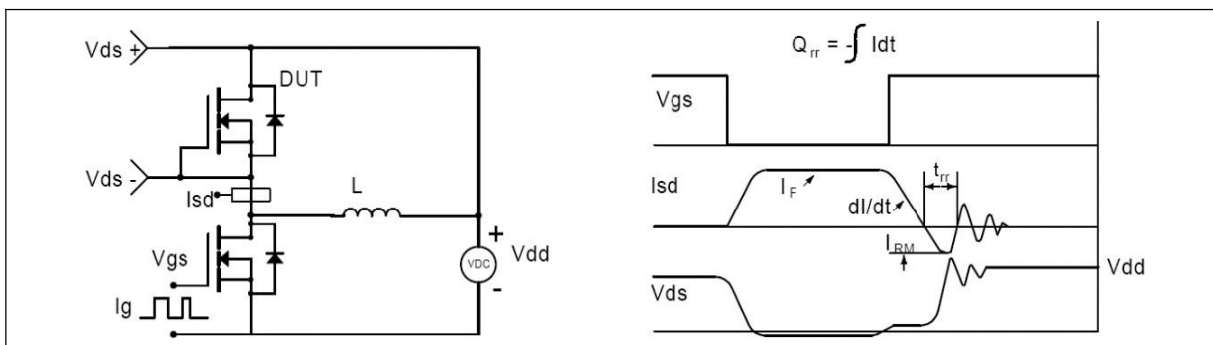
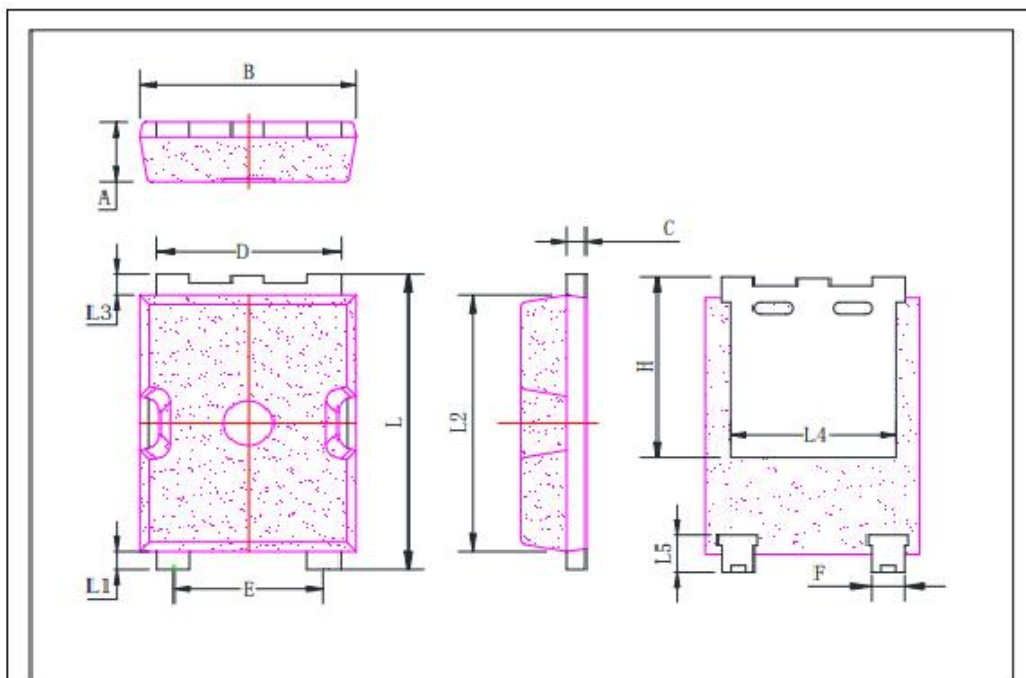


Figure 4. Diode reverse recovery test circuit & waveforms

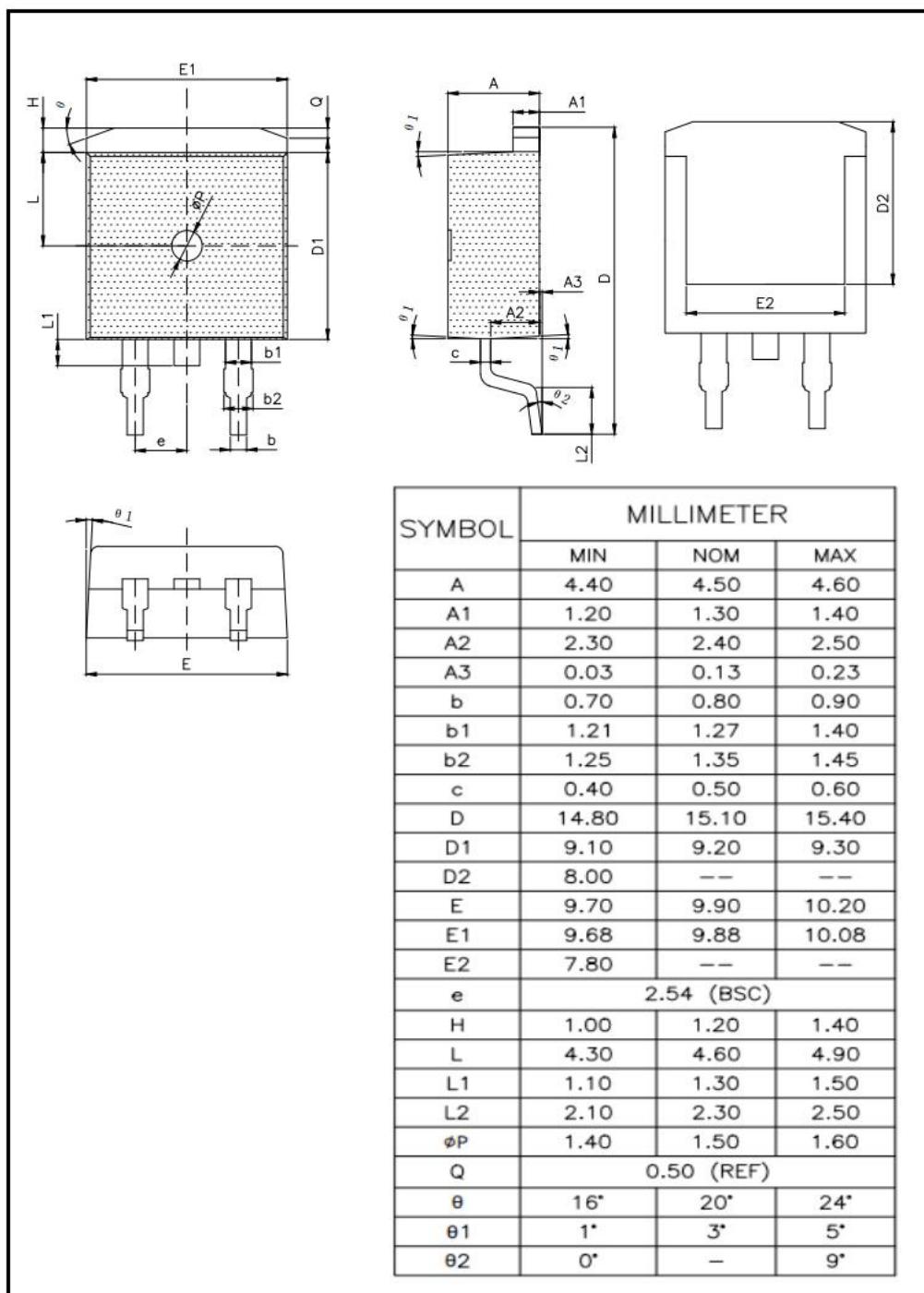
Package Information PTO252



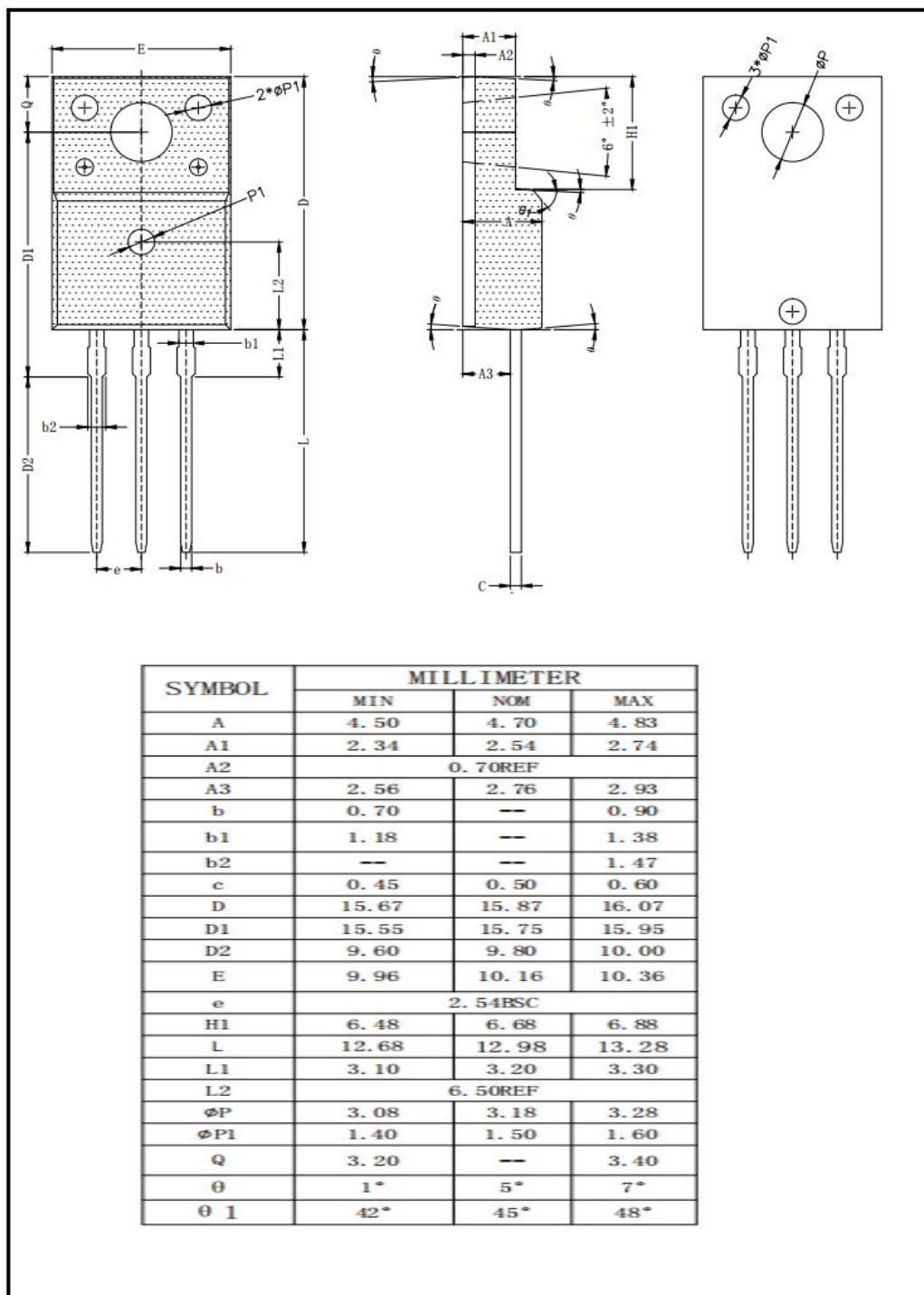
unit mm

Symbol	Min	Typ	Max
A	1.90	2.00	2.10
B	6.50	6.60	6.70
C	0.45	0.50	0.60
D	5.50	5.60	5.70
E	4.50	4.60	4.70
F	0.90	1.00	1.05
H	5.90	6.05	6.20
L	9.80	9.90	10.0
L1	0.50	0.60	0.70
L2	8.50	8.60	8.70
L3	0.60	0.70	0.80
L4	4.65	4.80	4.90
L5	1.05	1.20	1.30

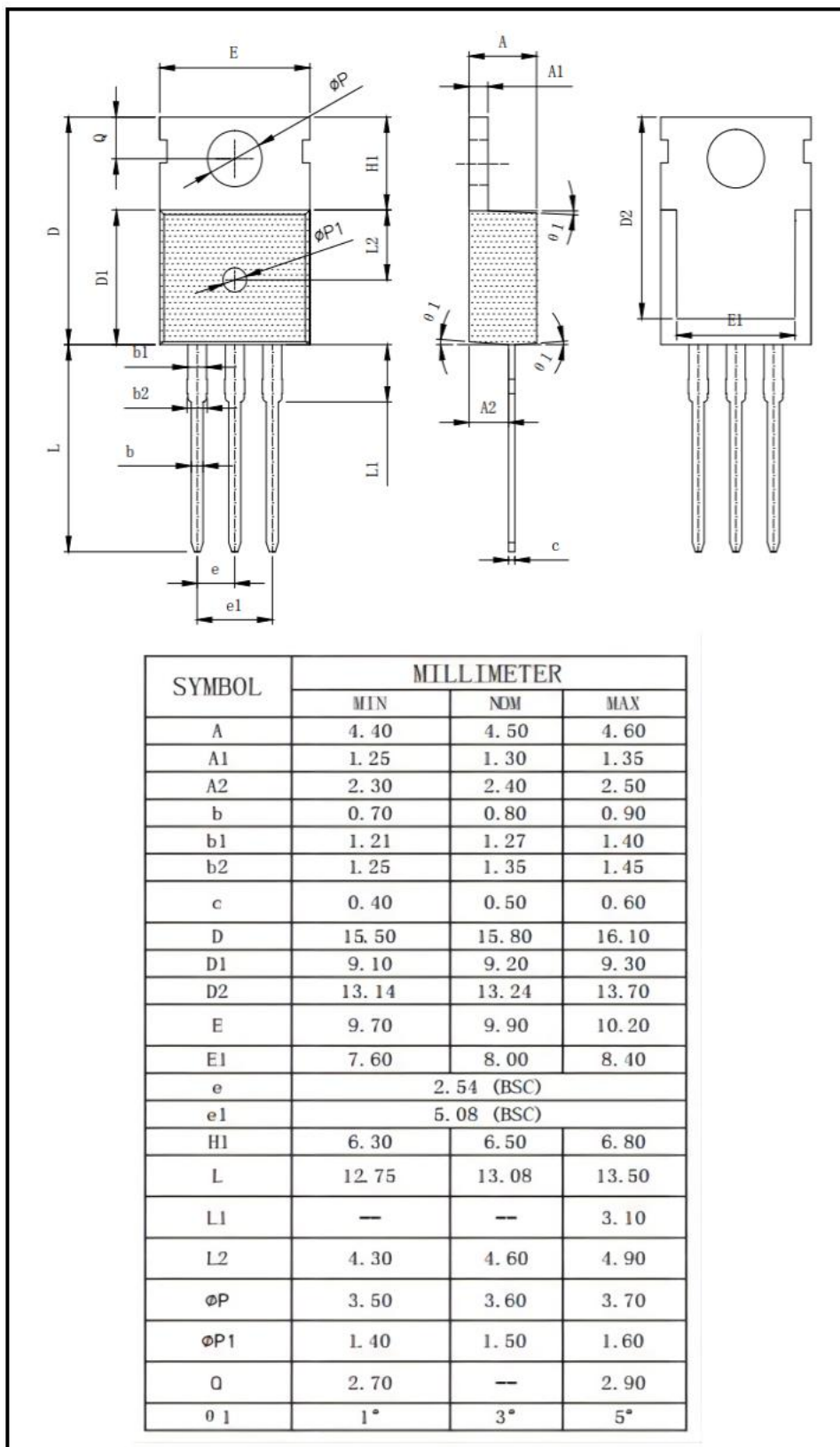
Package Information TO263-2L



Package Information TO220-F



Package Information TO220P



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