

General Description

JMX65R600ME 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, JMX65R600ME series is optimized for extreme switching performance to minimize switching loss.

“ME” series is optimized for its switching characteristics to achieve aggressive EMI standards.

Features

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

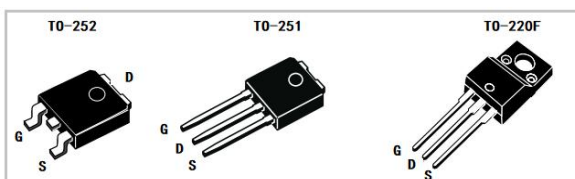
Applications

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

ORDERING INFORMATION

PACKAGE	TEMPERATURE RANGE	ORDERING PART NUMBER	TRANSPORT MEDIA
TO252-2	-55 °C to 150 °C	JMD65R600METR	Tape and Reel 2500 units
TO220F	-55 °C to 150 °C	JMF65R600METH	TUBE 1000 units
TO-251-3	-55 °C to 150 °C	JMC65R600METH	TUBE 4320 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⁾ , $T_C=25^{\circ}\text{C}$	I_D	8	A
Continuous drain current ¹⁾ , $T_C=100^{\circ}\text{C}$		4.6	
Pulsed drain current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_D, \text{ pulse}$	24	A
Continuous diode forward current ¹⁾ , $T_C=25^{\circ}\text{C}$	I_S	8	A
Diode pulsed current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_S, \text{ pulse}$	24	A
Power dissipation ³⁾ , $T_C=25^{\circ}\text{C}$ TO-251 TO-252	P_D	65	W
Power dissipation ³⁾ , $T_C=25^{\circ}\text{C}$ TO-220F	P_D	25	W
Single pulsed avalanche energy ⁵⁾	E_{AS}	120	mJ
MOSFET dv/dt ruggedness, $V_{DS}=0 \dots 480\text{ V}$	dv/dt	50	V/ns
Reverse diode dv/dt , $V_{DS}=0 \dots 480\text{ V}$, $I_{SD} \leq I_D$	dv/dt	15	V/ns
Operation and storage temperature	T_{stg}, T_j	-55 to 150	$^{\circ}\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-case TO-251 TO252-2L	R θ JC	1.5	°C/W
Thermal resistance, junction-case TO220F	R θ JC	4.7	°C/W
Thermal resistance, junction-ambient ⁴⁾	R θ JA	65	°C/W

Electrical Characteristics at T_j=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 uA
Gate threshold voltage	VGS(th)	2.5		3.9	V	VDS=VGS, ID=250 uA
Drain-source on- state resistance	RDS(ON)		0.53	0.6	Ω	VGS=10 V, ID=2.0 A
Gate-source leakage Current	IGSS			100	nA	VGS=30 V
				-100	nA	VGS=-30 V
Drain-source leakage current	IDSS			1	μA	VDS=650 V, VGS=0 V

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	Ciss		540		pF	VGS=0 V, VDS=400 V, f=100 KHz
Output capacitance	Coss		23		pF	
Reverse transfer capacitance	Crss		1.5		pF	
Turn-on delay time	td(on)		15		ns	VGS=10 V, VDS=400 V, RG=25 Ω, ID=7.0A
Rise time	tr		30		ns	
Turn-off delay time	td(off)		15		ns	
Fall time	tf		26		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Qg		15.5		nC	VGS=10 V, VDS=400 V, ID=7A
Gate-source charge	Qgs		4.5		nC	
Gate-drain charge	Qgd		5.7		nC	
Gate plateau voltage	Vplateau		5.8		V	

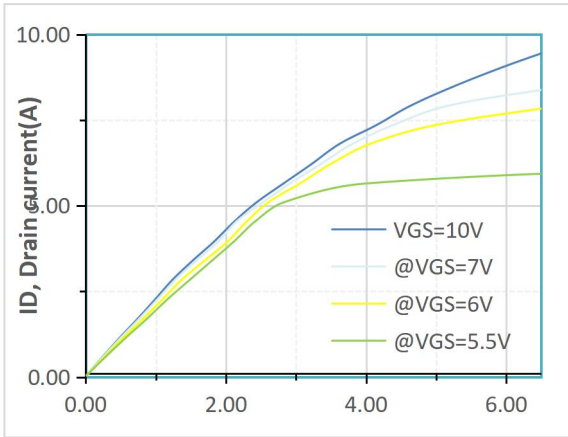
Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	VSD			1.4	V	IS=8 A, VGS=0 V
Reverse recovery time	trr		175		ns	VR=400 V, IS=3.0 A, di/dt=100 A/μs
Reverse recovery charge	Qrr		2.1		μC	
Peak reverse recovery current	Irrm		16.9		A	

Note

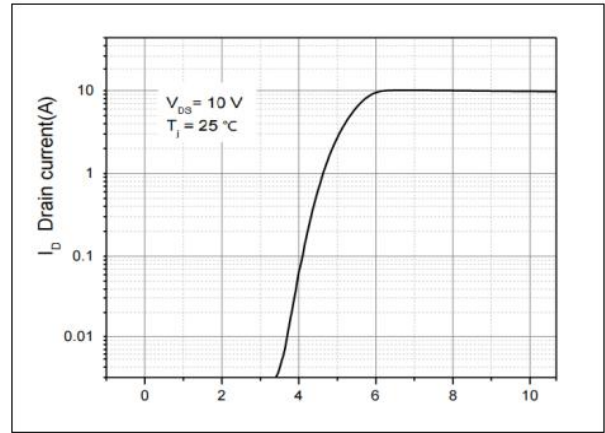
- 1) Calculated continuous current based on maximum allowable junction temperature.
- 2) Repetitive rating; pulse width limited by max. junction temperature.
- 3) Pd is based on max. junction temperature, using junction-case thermal resistance.
- 4) The value of R θ JA is measured with the device mounted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

Electrical Characteristics Diagrams



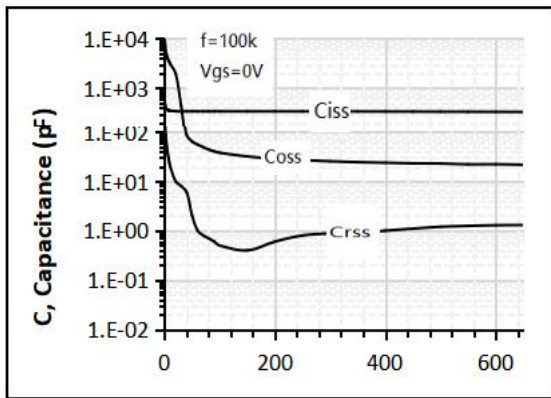
V_{DS}, Drain-source voltage (V)

Figure 1. Typ. output characteristics



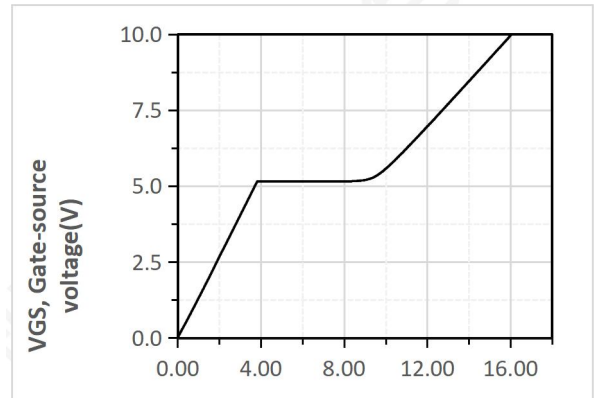
V_{GS}, Gate-source voltage(V)

Figure 2. Typ. transfer characteristics



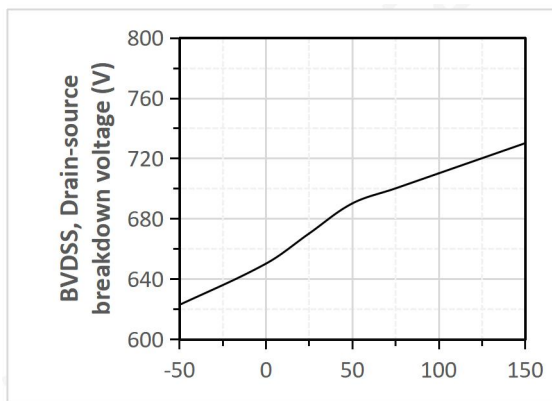
V_{DS}, Drain-source voltage (V)

Figure 3. Typ. capacitances



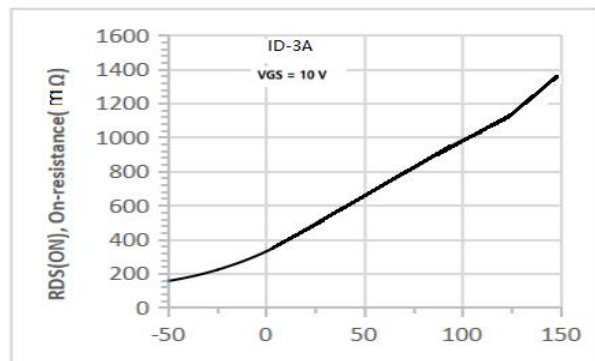
Q_g, Gate charge(nC)

Figure 4. Typ. gate charge



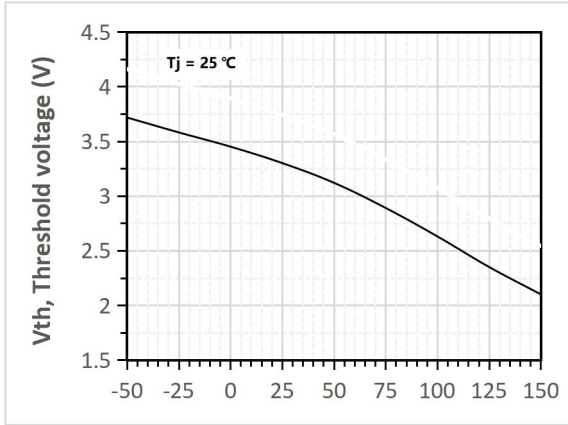
T_j, Junction temperature (°C)

Figure 5. Drain-source breakdown voltage



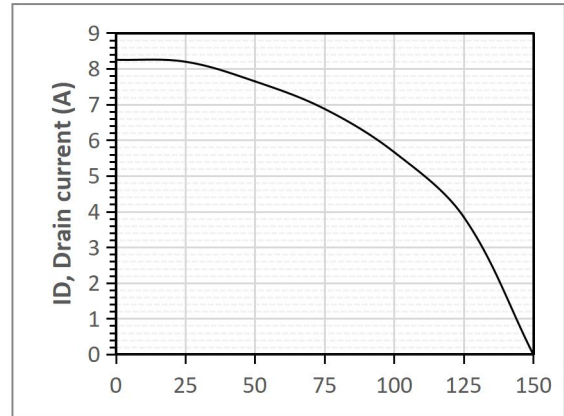
T_j, Junction temperature (°C)

Figure 6. Drain-source on-state resistance



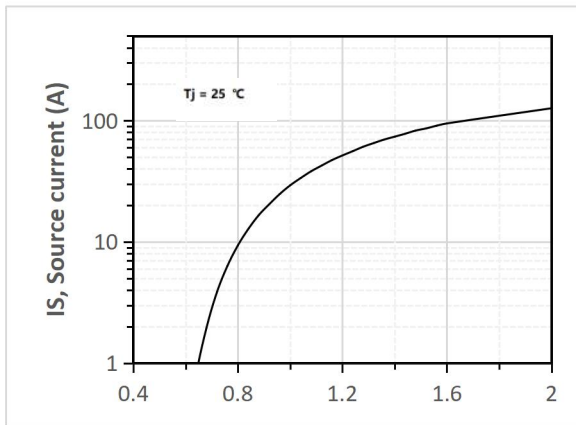
Tj, Junction Temperature (°C)

Figure 7. Threshold voltage



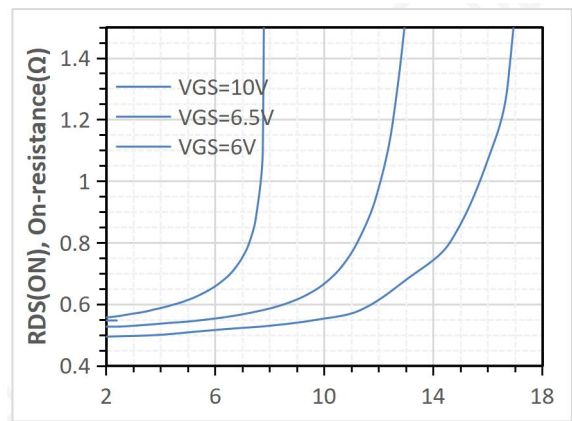
Tc, Case Temperature (°C)

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

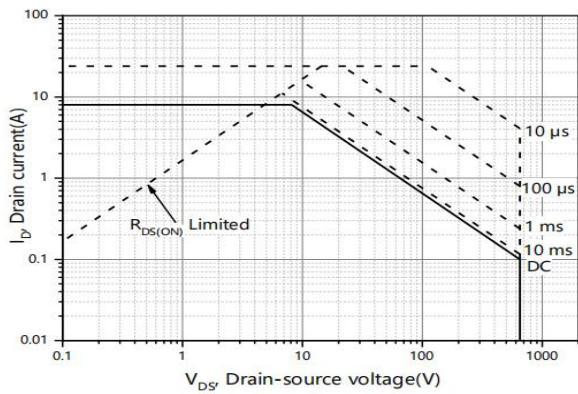


Figure 11. Safe operation area Tc=25 °C

Test circuits and waveforms

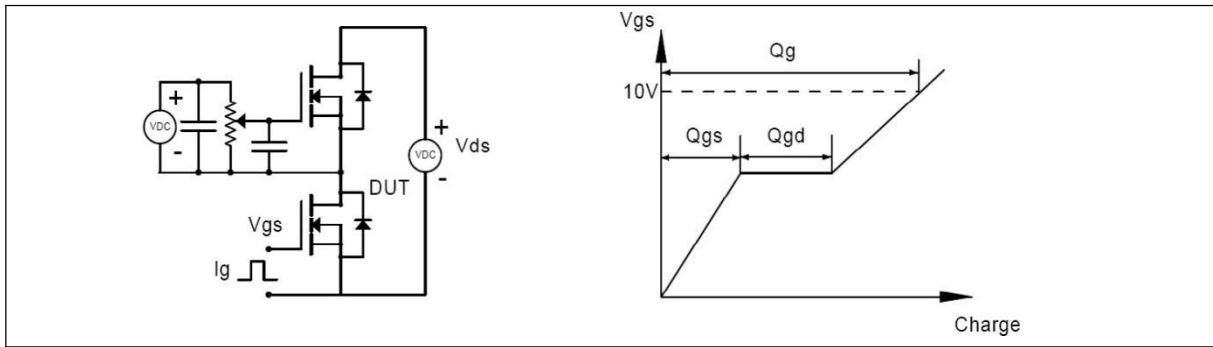


Figure 1. Gate charge test circuit & waveform

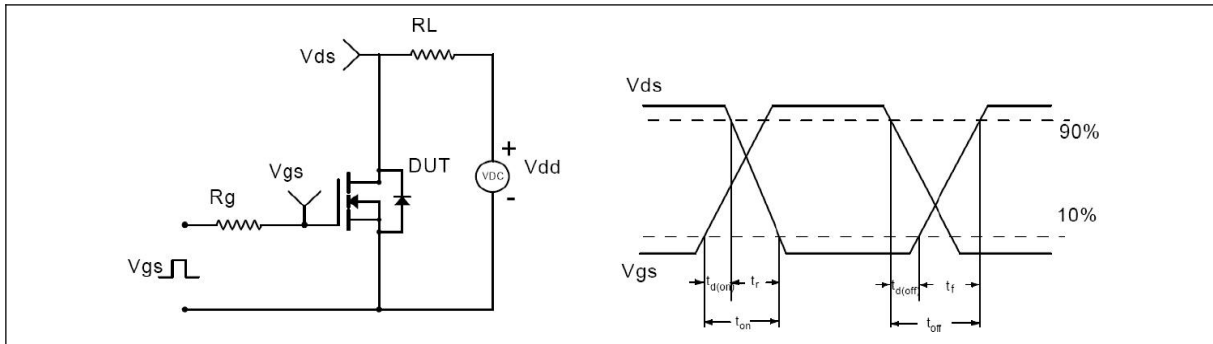


Figure 2. Switching time test circuit & waveforms

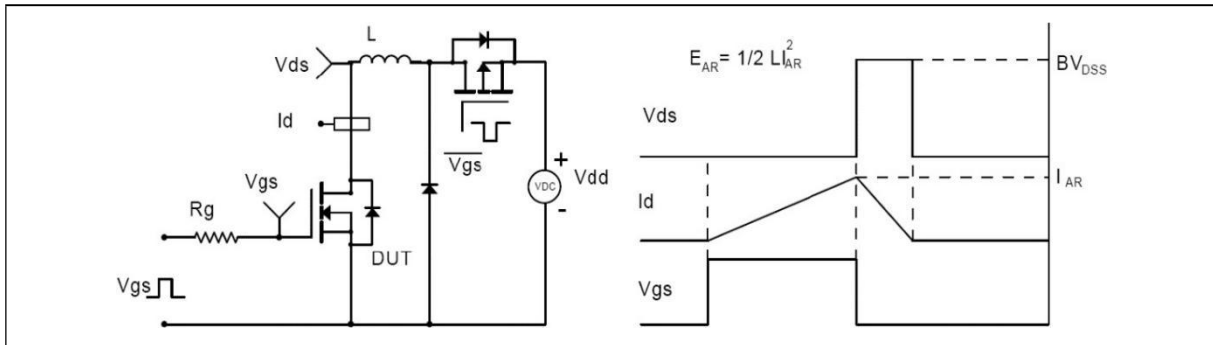


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

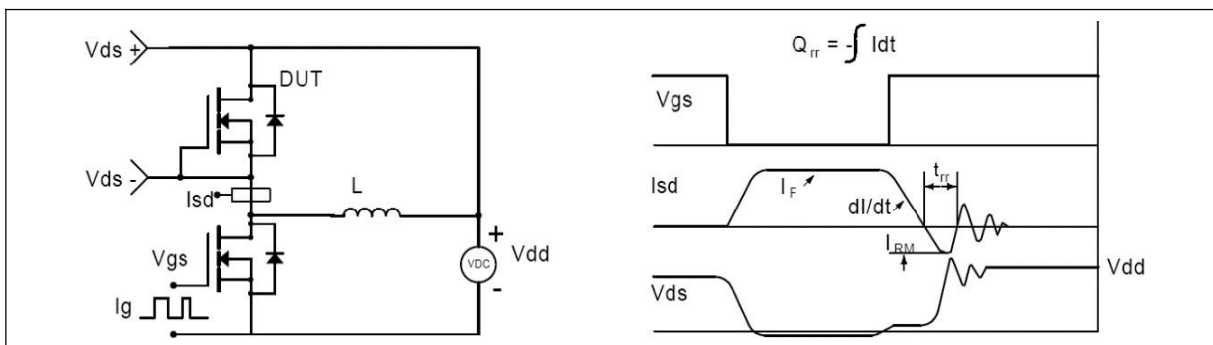
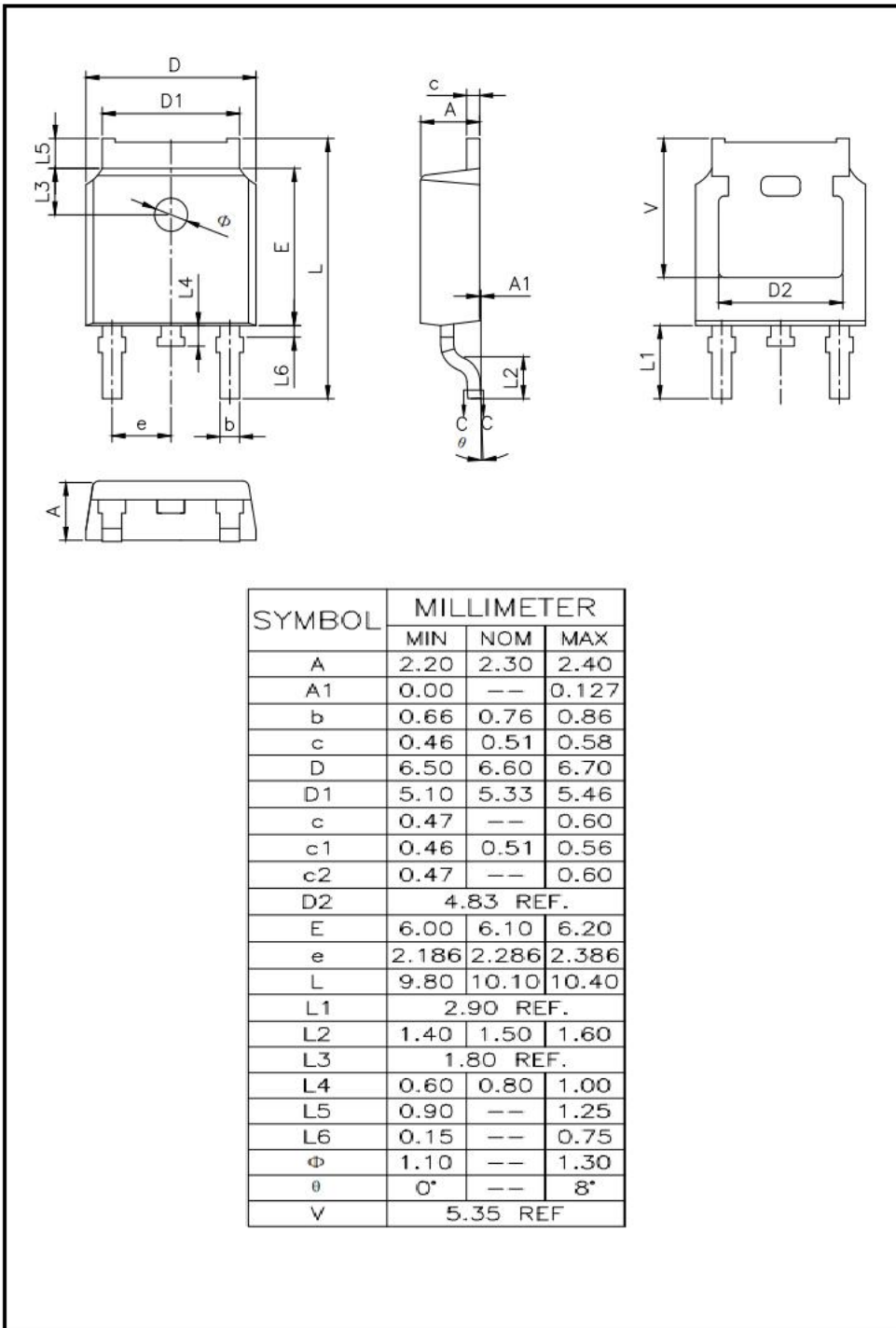
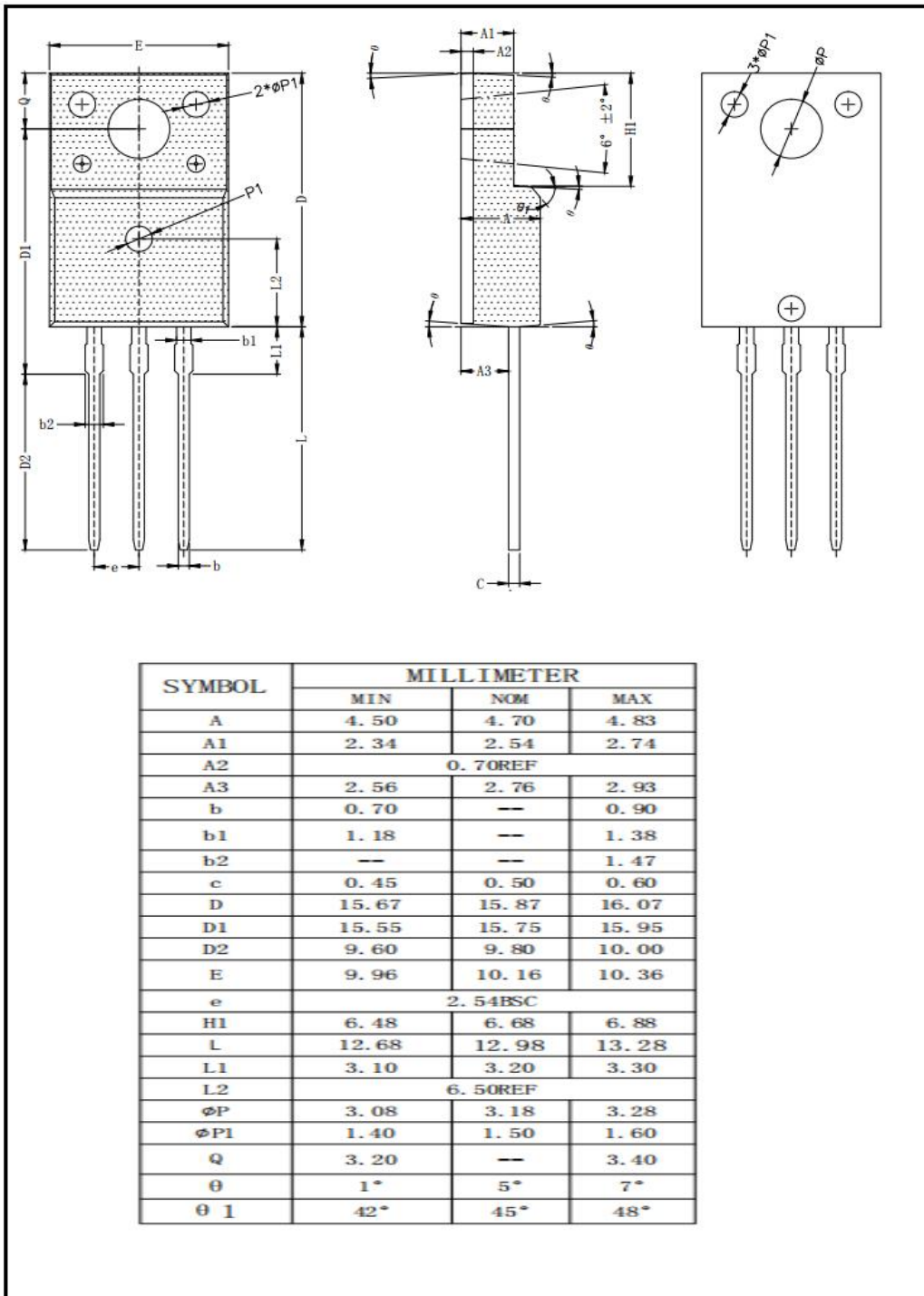


Figure 4. Diode reverse recovery test circuit & waveforms

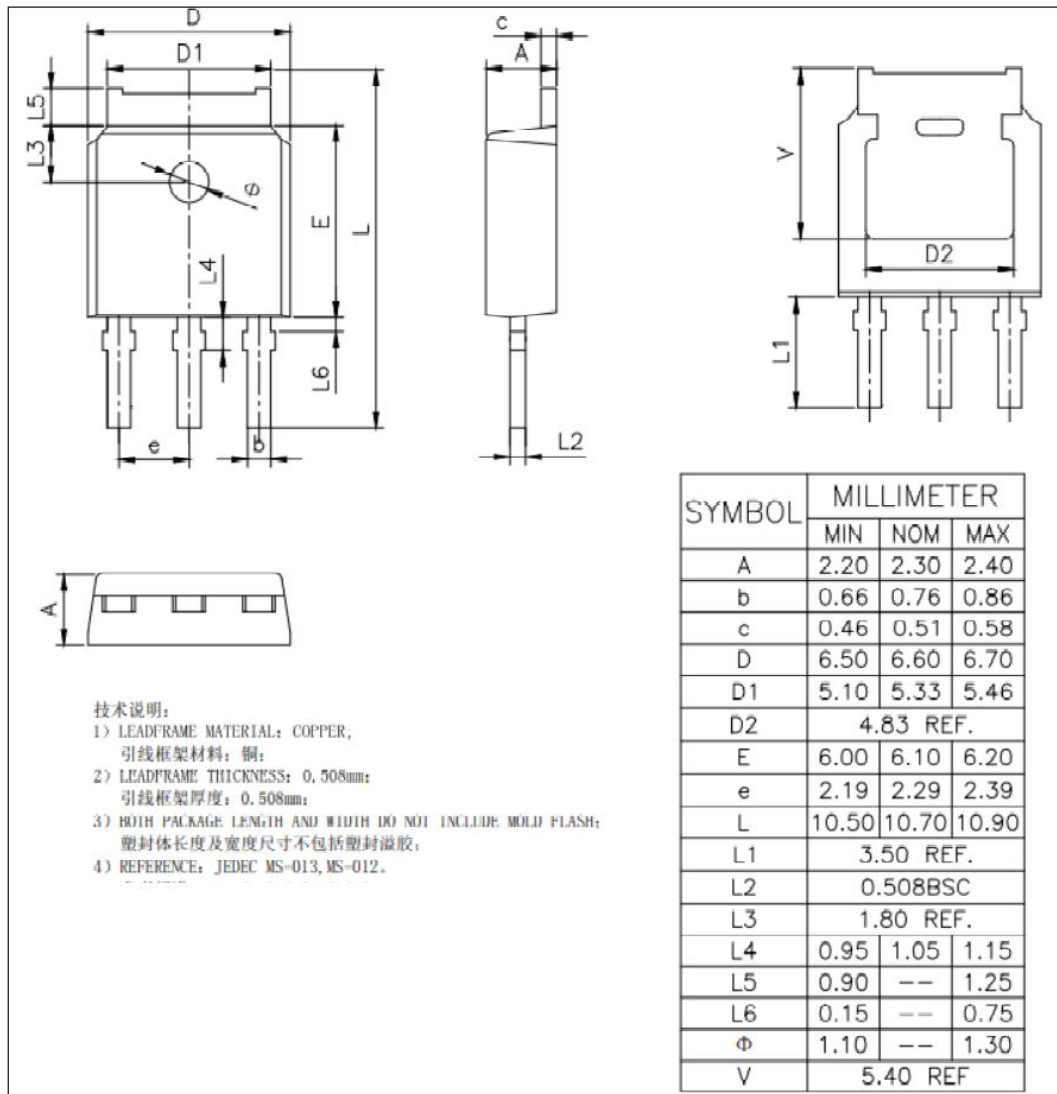
Package Information TO252-2L



Package Information TO220-F



Package Information TO251-3L



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