

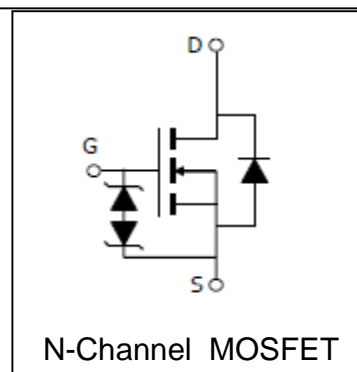
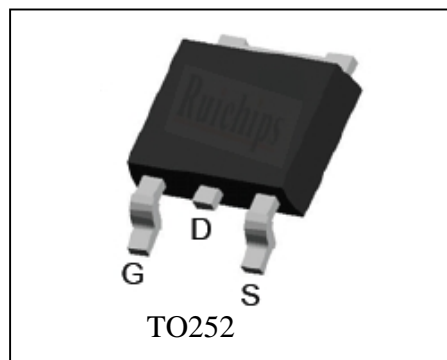
### Features

- 100V/12A,  
 $R_{DS(ON)} = 145m$  (Typ.) @  $V_{GS} = 10V$   
 $R_{DS(ON)} = 160m$  (Typ.) @  $V_{GS} = 4.5V$
- Super High Dense Cell Design
- ESD protected
- Reliable and Rugged
- 100% avalanche tested
- Lead Free and Green Devices Available (RoHS Compliant)

### Applications

- Converters

### Pin Description



### Absolute Maximum Ratings

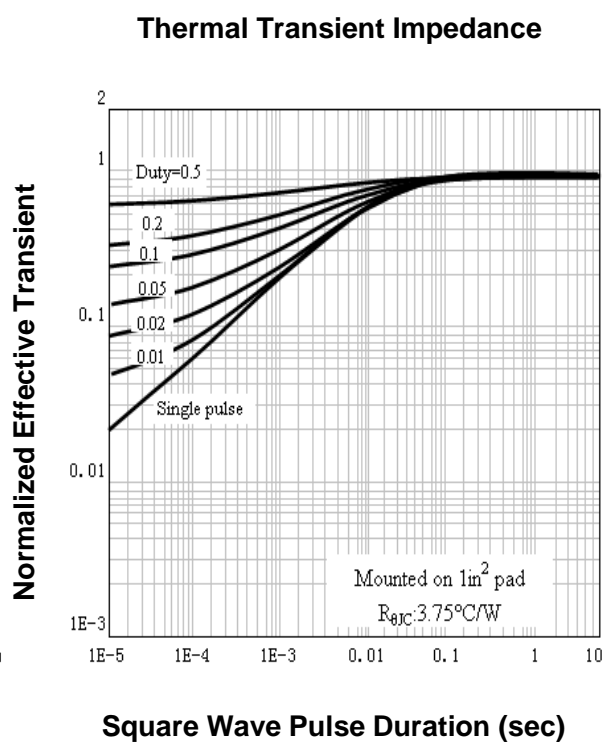
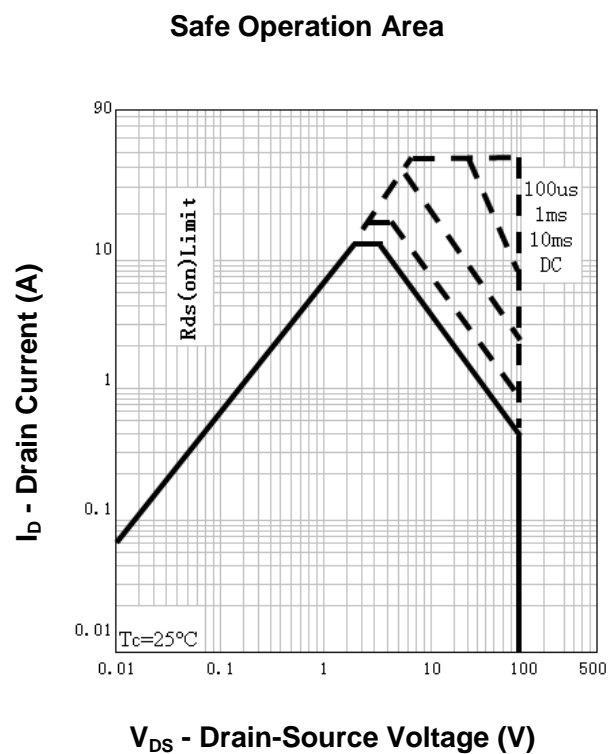
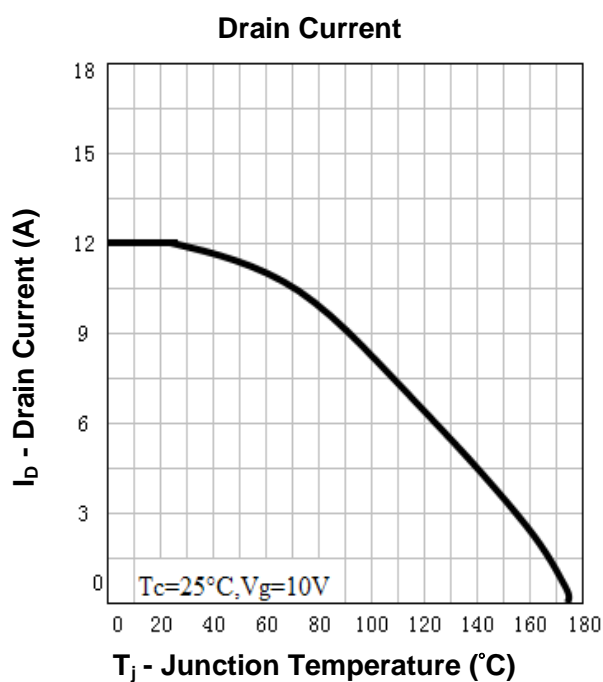
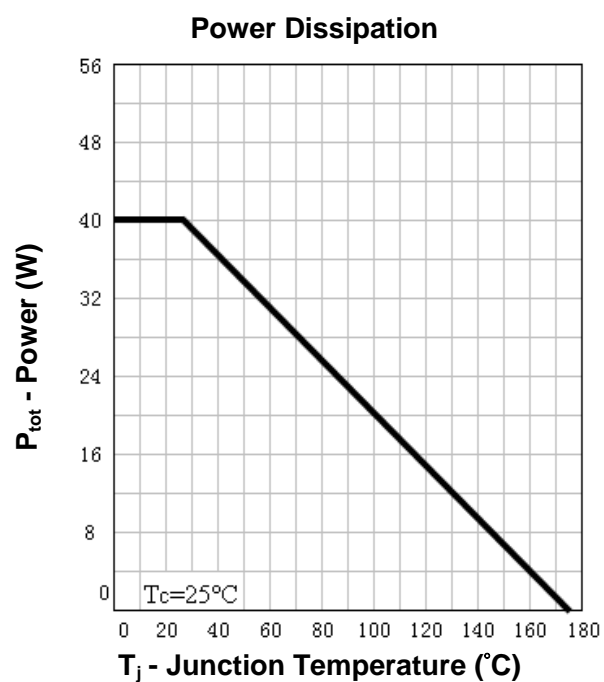
Symbol	Parameter		Rating	Unit
Common Ratings (T <sub>C</sub> =25°C Unless Otherwise Noted)				
V <sub>DSS</sub>	Drain-Source Voltage		100	V
V <sub>GSS</sub>	Gate-Source Voltage		±20	
T <sub>J</sub>	Maximum Junction Temperature		175	°C
T <sub>STG</sub>	Storage Temperature Range		-55 to 175	°C
I <sub>S</sub>	Diode Continuous Forward Current	T <sub>C</sub> =25°C	12	A
Mounted on Large Heat Sink				
I <sub>DP</sub>	300μs Pulse Drain Current Tested	T <sub>C</sub> =25°C	48 <sup>①</sup>	A
I <sub>D</sub>	Continuous Drain Current(V <sub>GS</sub> =10V)	T <sub>C</sub> =25°C	12 <sup>②</sup>	A
		T <sub>C</sub> =100°C	8	
P <sub>D</sub>	Maximum Power Dissipation	T <sub>C</sub> =25°C	40	W
		T <sub>C</sub> =100°C	20	
R <sub>θJC</sub>	Thermal Resistance-Junction to Case		3.75	°C/W
Drain-Source Avalanche Ratings				
E <sub>AS</sub> <sup>③</sup>	Avalanche Energy, Single Pulsed		9	mJ

**Electrical Characteristics** ( $T_C=25^{\circ}\text{C}$  Unless Otherwise Noted)

Symbol	Parameter	Test Condition	RU1HE12L			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA	100			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 100V, V <sub>GS</sub> =0V			1	μA
		T <sub>J</sub> =85°C			30	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA	1.5	2	2.7	V
I <sub>GSS</sub>	Gate Leakage Current	V <sub>GS</sub> =±16V, V <sub>DS</sub> =0V			±10	μA
R <sub>DS(ON)</sub> ④	Drain-Source On-state Resistance	V <sub>GS</sub> = 10V, I <sub>DS</sub> =6A		145	160	mΩ
		V <sub>GS</sub> = 4.5V, I <sub>DS</sub> =4A		160	190	mΩ
Diode Characteristics						
V <sub>SD</sub> ④	Diode Forward Voltage	I <sub>SD</sub> =6A, V <sub>GS</sub> =0V			1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>SD</sub> =6A, dI <sub>SD</sub> /dt=100A/μs		45		ns
Q <sub>rr</sub>	Reverse Recovery Charge			75		nC
Dynamic Characteristics ⑤						
R <sub>G</sub>	Gate Resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz		1.1		Ω
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =50V, Frequency=1.0MHz		450		pF
C <sub>oss</sub>	Output Capacitance			75		
C <sub>rss</sub>	Reverse Transfer Capacitance			45		
t <sub>d(ON)</sub>	Turn-on Delay Time	V <sub>DD</sub> =50V, R <sub>L</sub> =8Ω, I <sub>DS</sub> =6A, V <sub>GEN</sub> = 10V, R <sub>G</sub> =6Ω		11		ns
t <sub>r</sub>	Turn-on Rise Time			14		
t <sub>d(OFF)</sub>	Turn-off Delay Time			27		
t <sub>f</sub>	Turn-off Fall Time			14		
Gate Charge Characteristics ⑤						
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =80V, V <sub>GS</sub> = 10V, I <sub>DS</sub> =6A		12	16	nC
Q <sub>gs</sub>	Gate-Source Charge			2		
Q <sub>gd</sub>	Gate-Drain Charge			3		

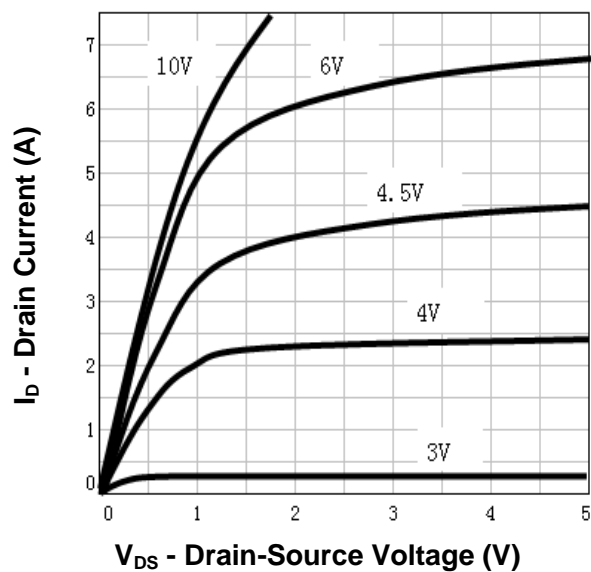
- Notes: ① Pulse width limited by safe operating area.  
 ② Calculated continuous current based on maximum allowable junction temperature.  
 ③ Limited by  $T_{Jmax}$ ,  $I_{AS}=6A$ ,  $V_{DD}=48V$ ,  $R_G=50\Omega$ , Starting  $T_J=25^{\circ}\text{C}$ .  
 ④ Pulse test; Pulse width $\leq 300\mu s$ , duty cycle $\leq 2\%$ .  
 ⑤ Guaranteed by design, not subject to production testing.

## Typical Characteristics

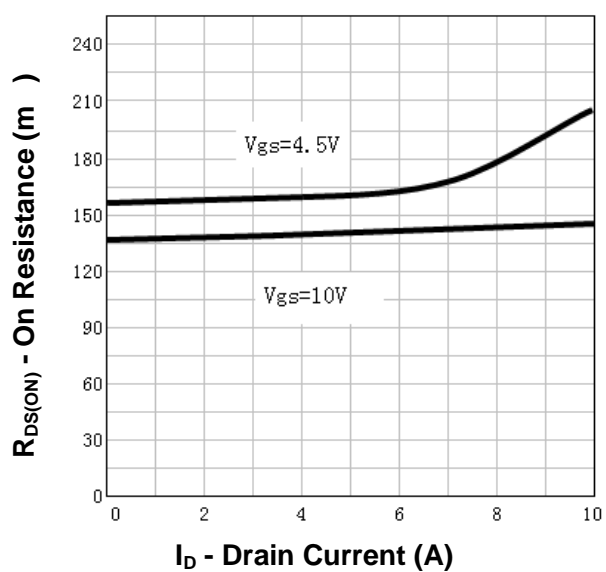


## Typical Characteristics

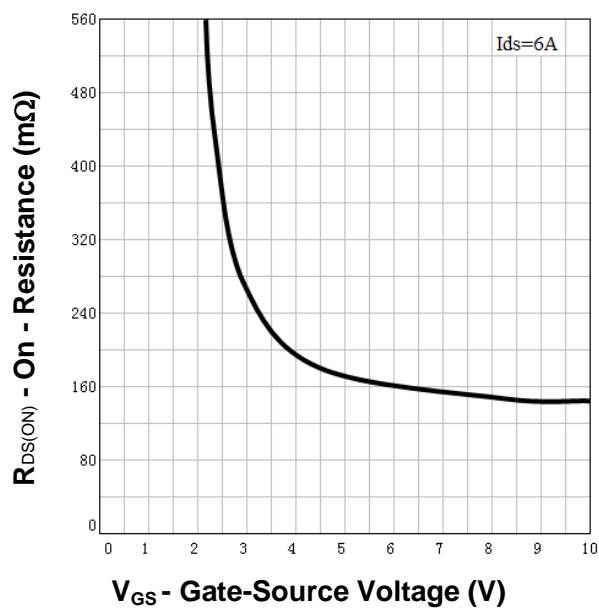
**Output Characteristics**



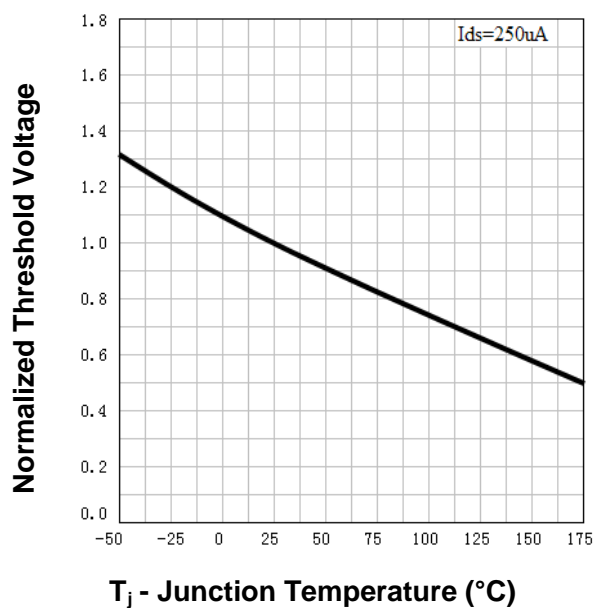
**Drain-Source On Resistance**



**Drain-Source On Resistance**

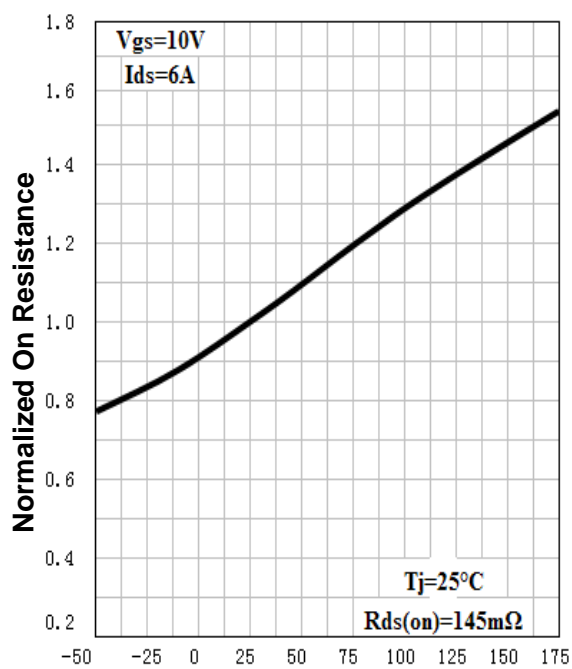


**Gate Threshold Voltage**



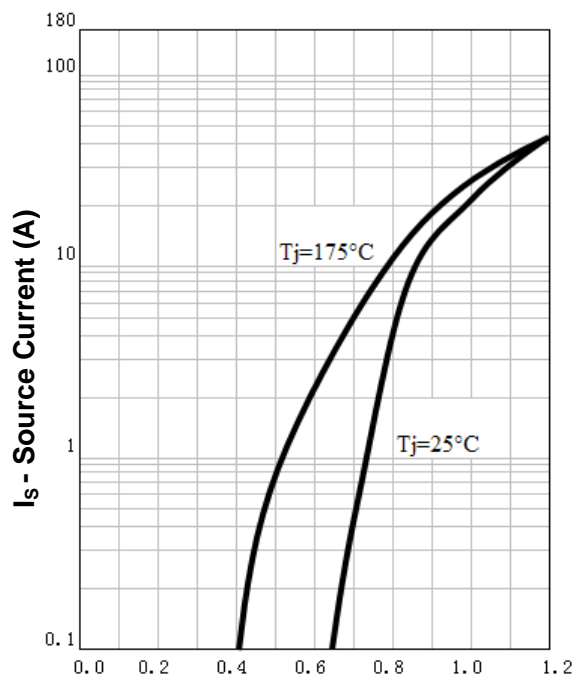
## Typical Characteristics

**Drain-Source On Resistance**



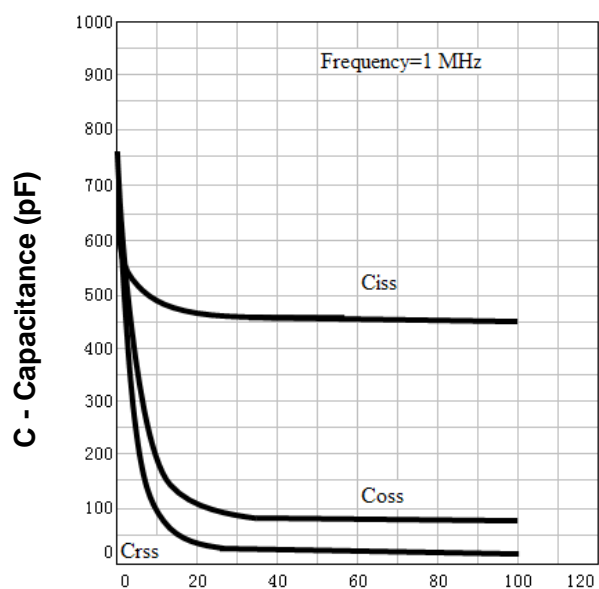
$T_j$  - Junction Temperature ( $^{\circ}\text{C}$ )

**Source-Drain Diode Forward**



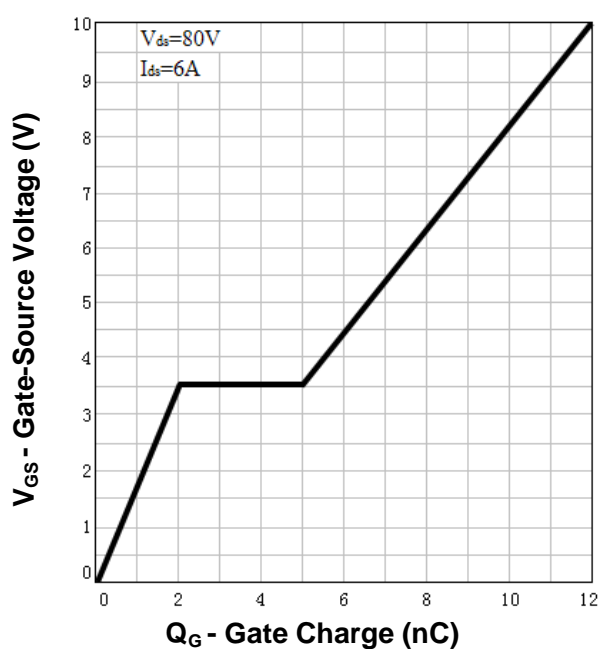
$V_{SD}$  - Source-Drain Voltage (V)

**Capacitance**



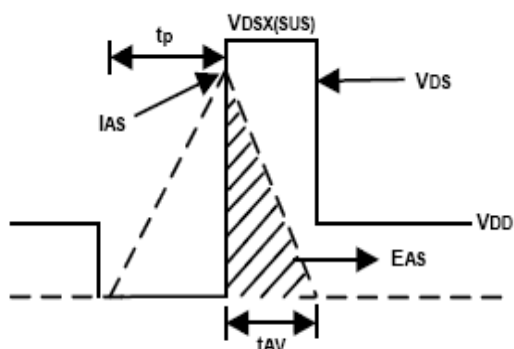
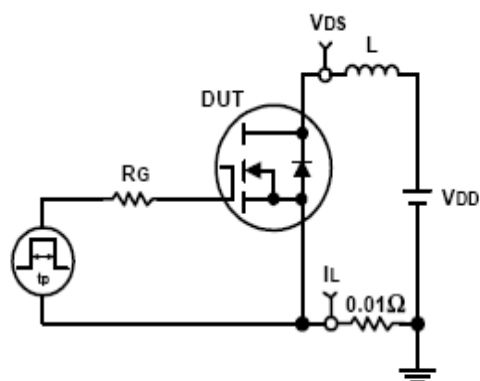
$V_{DS}$  - Drain-Source Voltage (V)

**Gate Charge**

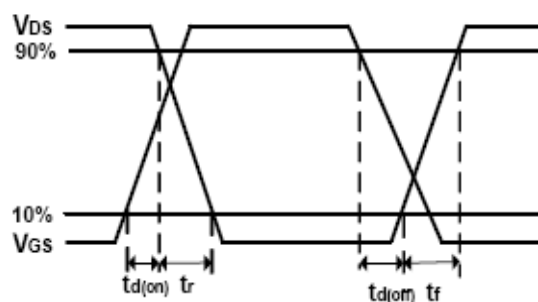
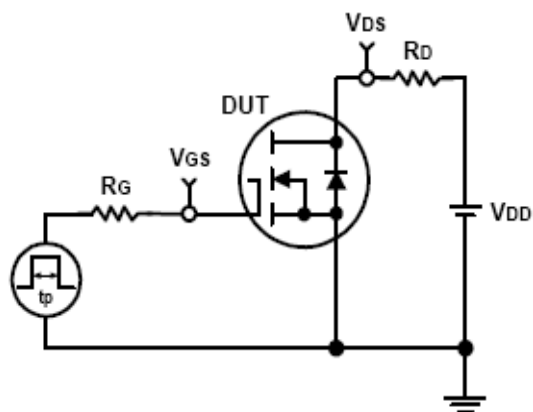


$Q_G$  - Gate Charge (nC)

## Avalanche Test Circuit and Waveforms



## Switching Time Test Circuit and Waveforms

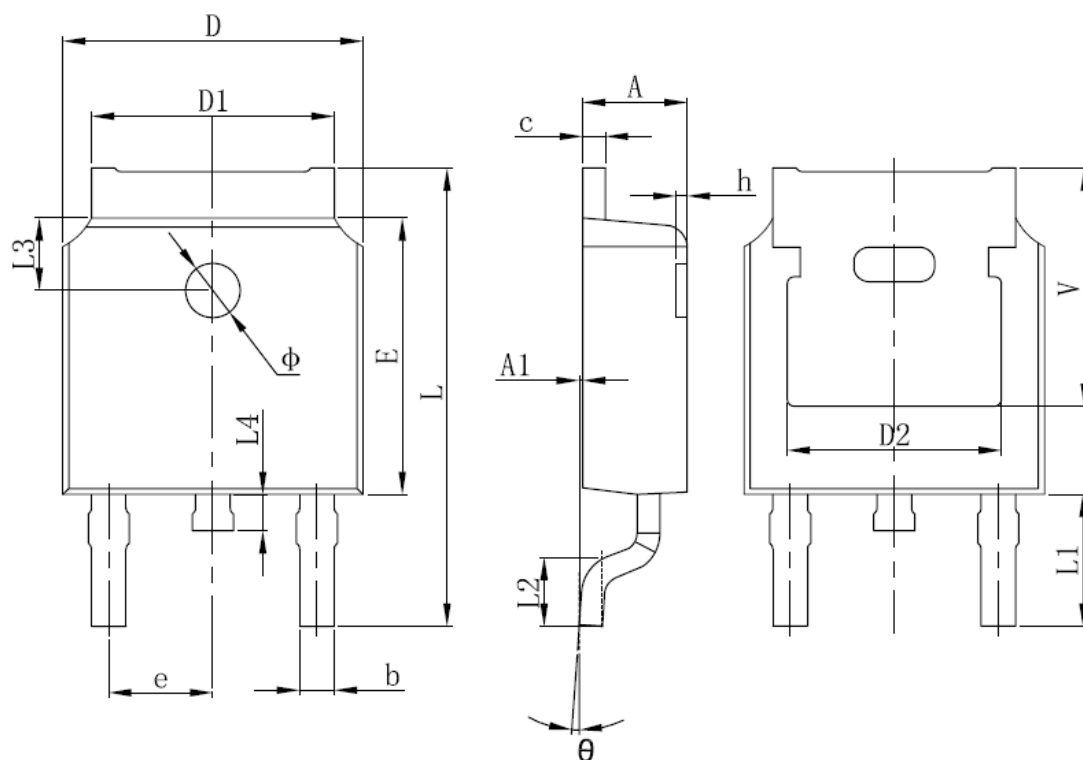


**Ordering and Marking Information**

Device	Marking	Package	Packaging	Quantity	Reel Size	Tape width
RU1HE12L	RU1HE12L	TO-252	Tape&Reel	2500	13''	16mm

# Package Information

## TO252-2L



SYMBOL	MM		INCH		SYMBOL	MM		INCH	
	MIN	MAX	MIN	MAX		MIN	MAX	MIN	MAX
A	2.200	2.400	0.087	0.094	L	9.800	10.400	0.386	0.409
A1	0.000	0.127	0.000	0.005	L1	2.900 REF.		0.114 REF.	
b	0.660	0.860	0.026	0.034	L2	1.400	1.700	0.055	0.067
C	0.460	0.580	0.018	0.023	L3	1.600 REF.		0.063REF.	
D	6.500	6.700	0.256	0.264	L4	0.600	1.000	0.024	0.039
D1	5.100	5.460	0.201	0.215	Φ	1.100	1.300	0.043	0.051
D2	4.830 REF.		0.190 REF.		θ	0°	8°	0°	8°
E	6.000	6.200	0.236	0.244	h	0.000	0.300	0.000	0.012
e	2.186	2.386	0.086	0.094	V	5.350 REF.		0.211 REF.	

ALL DIMENSIONS REFER TO JEDEC STANDARD  
DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS