

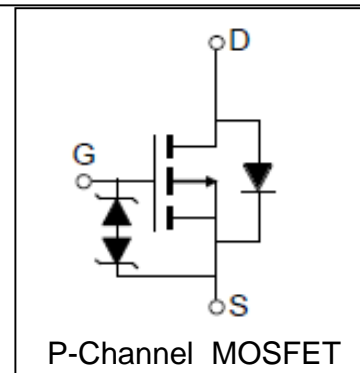
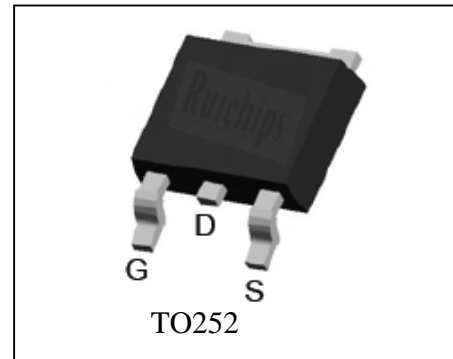
## Features

- -40V/-32A,  
 $R_{DS(ON)} = 20m$  (tpy.)@ $V_{GS} = -10V$   
 $R_{DS(ON)} = 30m$  (tpy.)@ $V_{GS} = -4.5V$
- Super High Dense Cell Design
- ESD protected
- Reliable and Rugged
- 100% avalanche tested
- Lead Free and Green Devices Available  
 (RoHS Compliant)

## Applications

- Power Supplies
- Inverter

## Pin Description



## Absolute Maximum Ratings

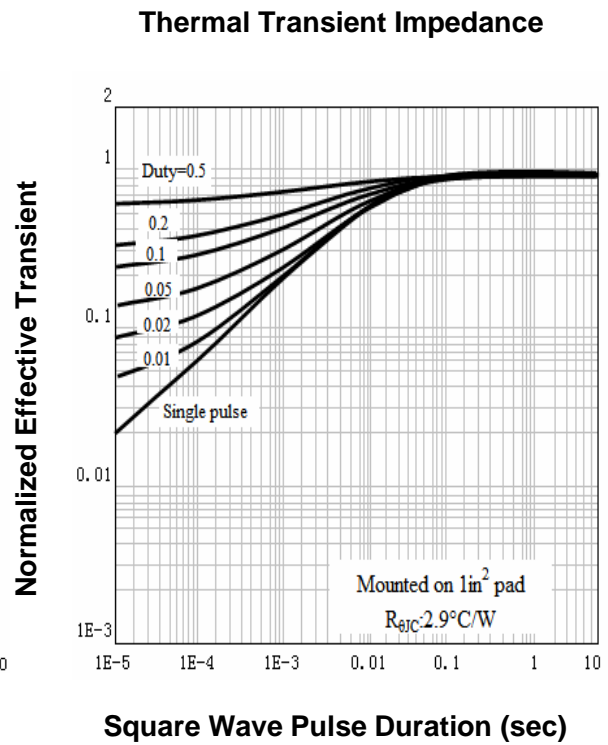
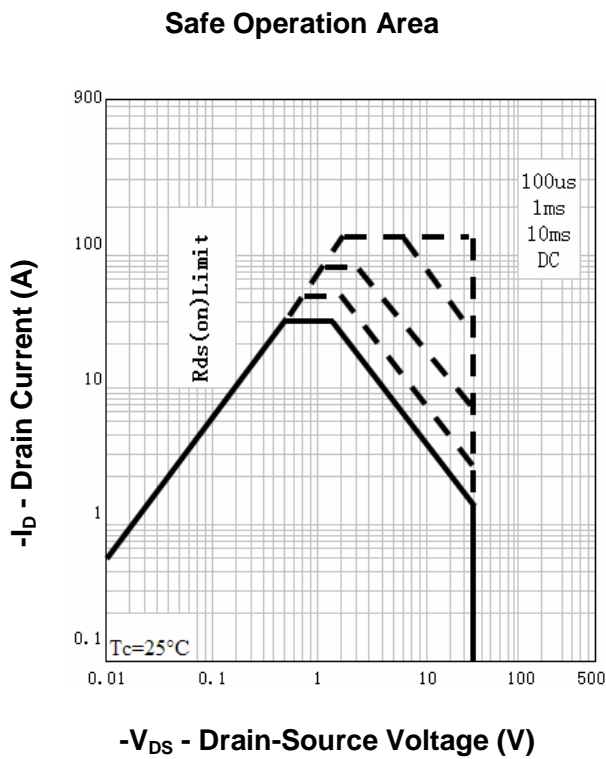
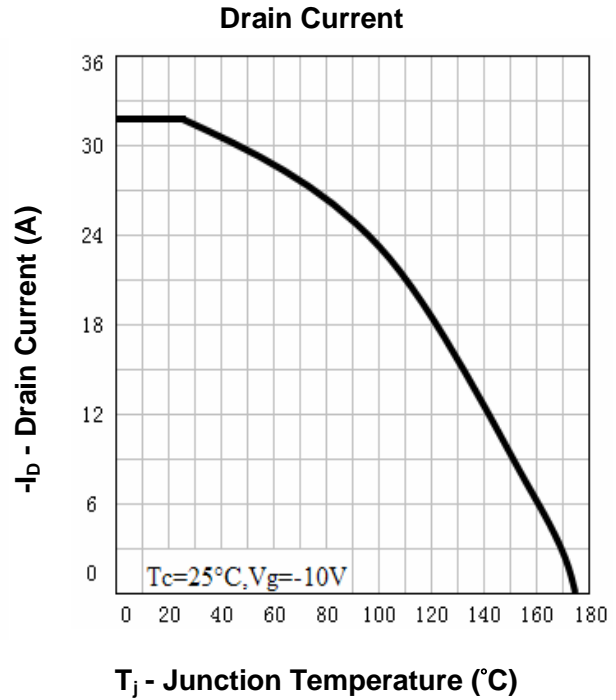
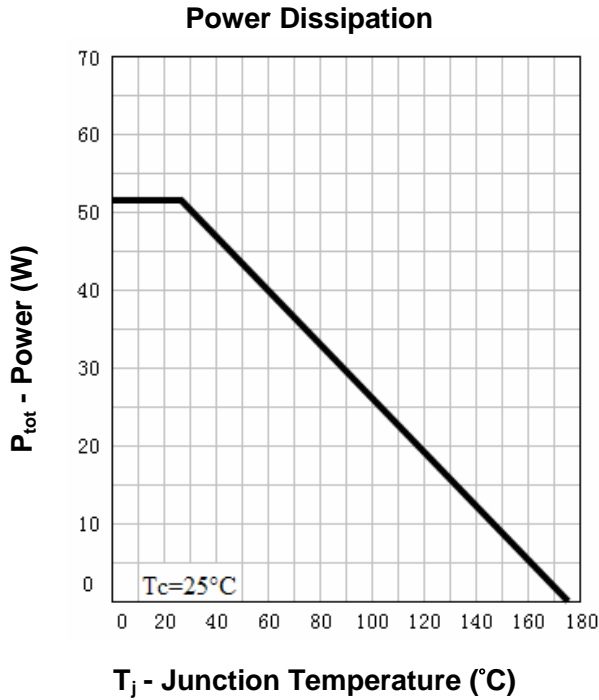
Symbol	Parameter	Rating	Unit
<b>Common Ratings</b> ( $T_C = 25^\circ\text{C}$ Unless Otherwise Noted)			
$V_{DSS}$	Drain-Source Voltage	-40	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	
$T_J$	Maximum Junction Temperature	175	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 175	$^\circ\text{C}$
$I_S$	Diode Continuous Forward Current	$T_C = 25^\circ\text{C}$ -32	A
<b>Mounted on Large Heat Sink</b>			
$I_{DP}$	300 $\mu\text{s}$ Pulse Drain Current Tested	$T_C = 25^\circ\text{C}$ -120 <sup>①</sup>	A
$I_D$	Continuous Drain Current	$T_C = 25^\circ\text{C}$ -32	A
		$T_C = 100^\circ\text{C}$ -23	
$P_D$	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$ 52	W
		$T_C = 100^\circ\text{C}$ 26	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	2.9	$^\circ\text{C}/\text{W}$
<b>Drain-Source Avalanche Ratings</b>			
$E_{AS}$ <sup>②</sup>	Avalanche Energy, Single Pulsed	144	mJ

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

Symbol	Parameter	Test Condition	RU40L10L			Unit
			Min.	Typ.	Max.	
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=-250\mu A$	-40			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-40V, V_{GS}=0V$			-1	$\mu A$
		$T_J=85^\circ C$			-30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=-250\mu A$	-1.0	-1.8	-2.5	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$			$\pm 10$	$\mu A$
$R_{DS(ON)}^{(3)}$	Drain-Source On-state Resistance	$V_{GS}=-10V, I_{DS}=-10A$		20	25	$m\Omega$
		$V_{GS}=-4.5V, I_{DS}=-8A$		30	35	$m\Omega$
<b>Diode Characteristics</b>						
$V_{SD}^{(3)}$	Diode Forward Voltage	$I_{SD}=-1A, V_{GS}=0V$		-0.75	-1	V
$t_{rr}$	Reverse Recovery Time	$I_{SD}=-1A, di_{SD}/dt=100A/\mu s$		36		ns
$Q_{rr}$	Reverse Recovery Charge			28		nC
<b>Dynamic Characteristics</b> <sup>(4)</sup>						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1MHz$		1.5		$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=-20V,$ Frequency=1.0MHz		2310		pF
$C_{oss}$	Output Capacitance			250		
$C_{rss}$	Reverse Transfer Capacitance			165		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=-20V, R_L=0.66\Omega,$ $I_{DS}=-30A, V_{GEN}=-10V,$ $R_G=6\Omega$		15		ns
$t_r$	Turn-on Rise Time			23		
$t_{d(OFF)}$	Turn-off Delay Time			43		
$t_f$	Turn-off Fall Time			17		
<b>Gate Charge Characteristics</b> <sup>(4)</sup>						
$Q_g$	Total Gate Charge	$V_{DS}=-32V, V_{GS}=-10V,$ $I_{DS}=-30A$		45		nC
$Q_{gs}$	Gate-Source Charge			8		
$Q_{gd}$	Gate-Drain Charge			15		

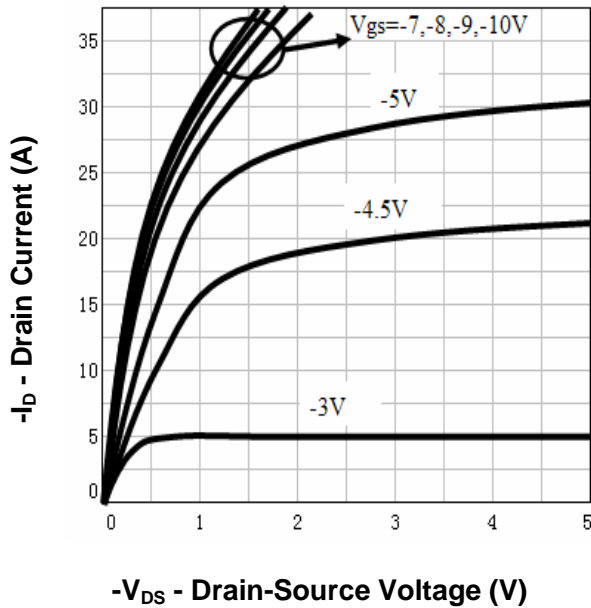
- Notes: ① Pulse width limited by safe operating area.  
 ② Limited by  $T_{Jmax}, I_{AS}=24A, V_{DD}=-24V, R_G=50\Omega$ , Starting  $T_J=25^\circ C$ .  
 ③ Pulse test; Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .  
 ④ Guaranteed by design, not subject to production testing.

**Typical Characteristics**

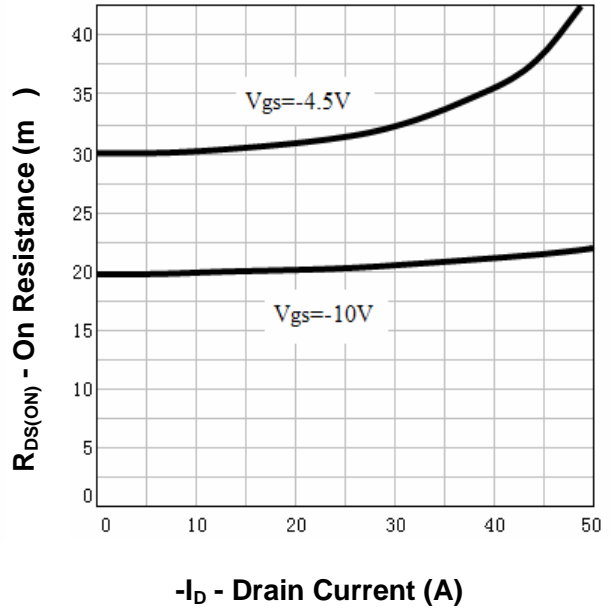


**Typical Characteristics**

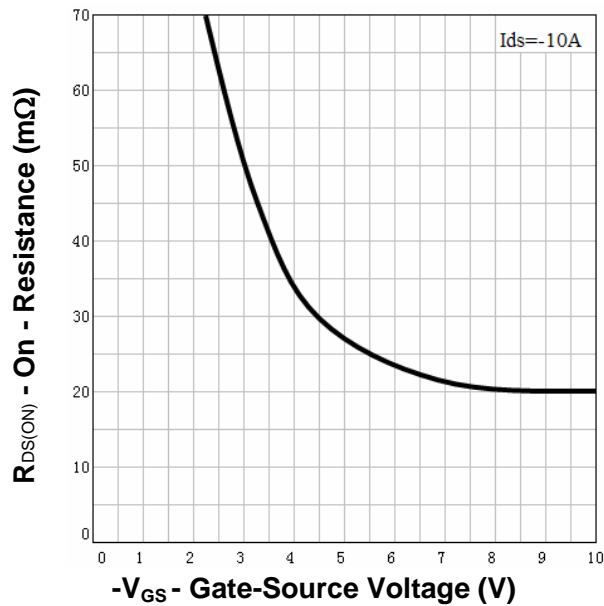
**Output Characteristics**



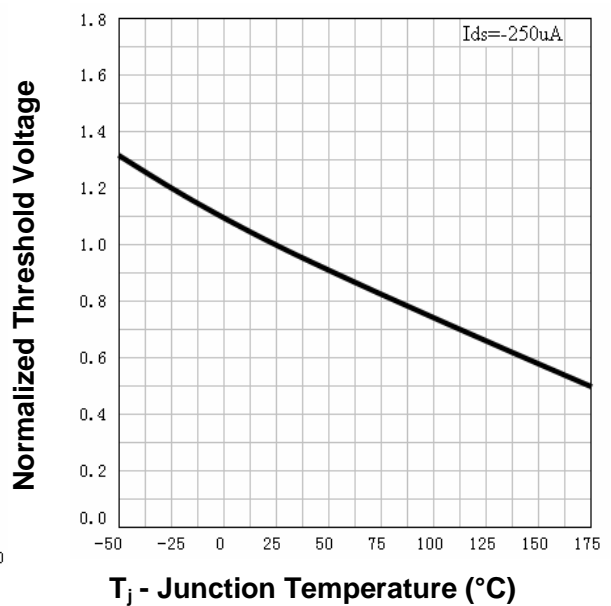
**Drain-Source On Resistance**



**Drain-Source On Resistance**

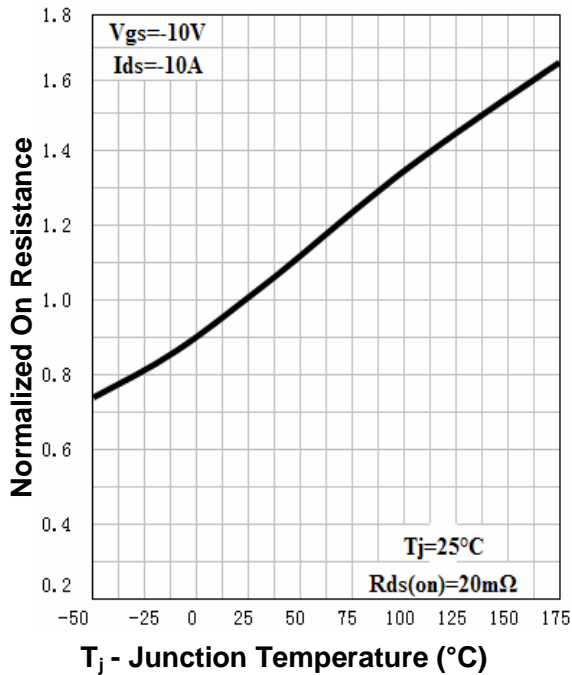


**Gate Threshold Voltage**

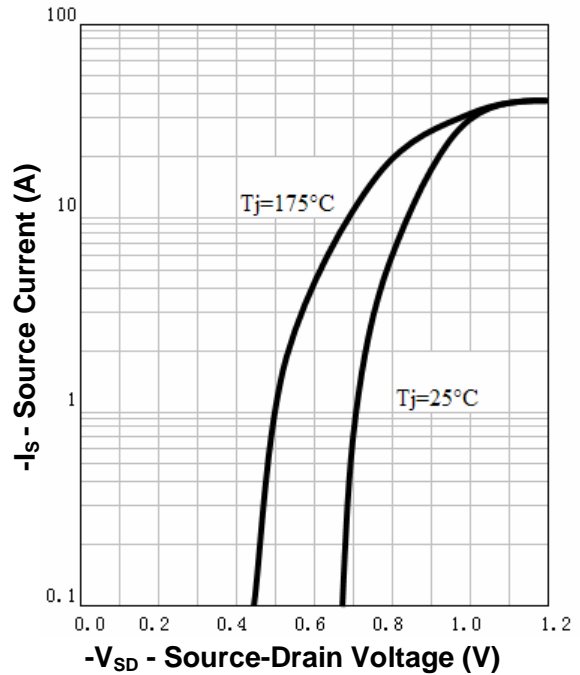


**Typical Characteristics**

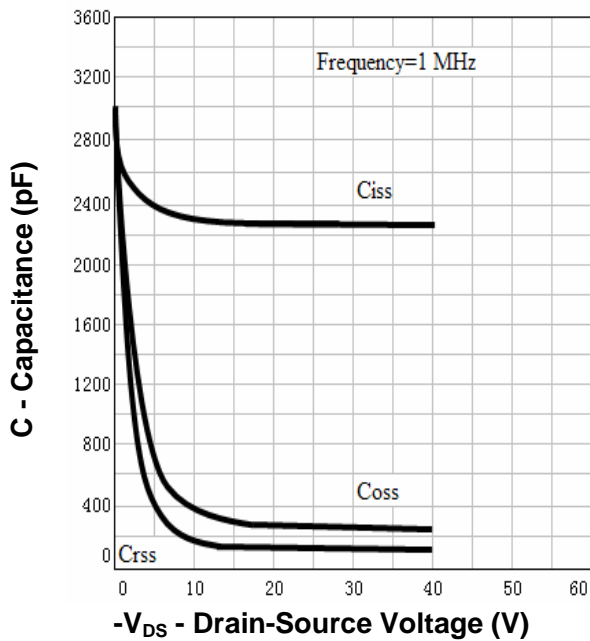
**Drain-Source On Resistance**



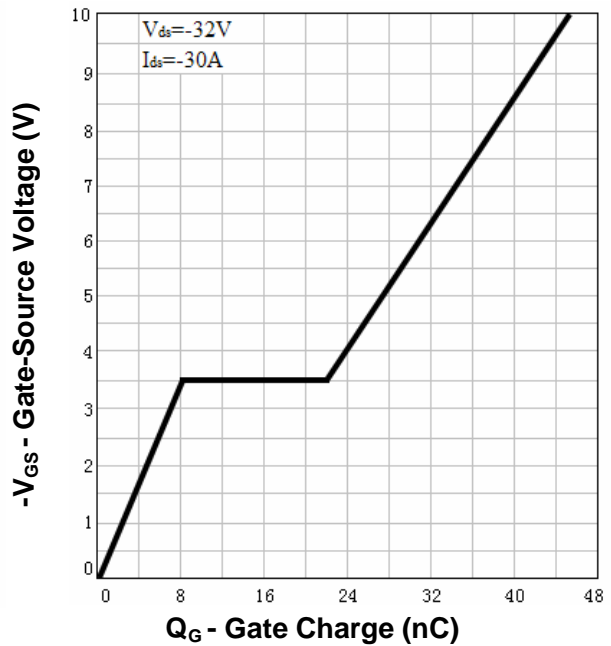
**Source-Drain Diode Forward**



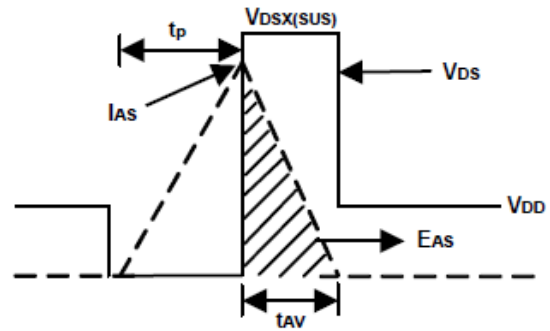
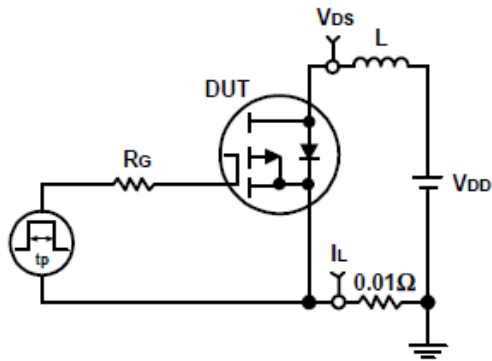
**Capacitance**



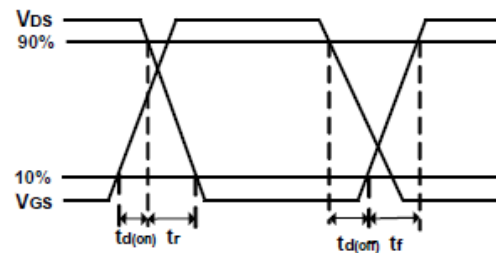
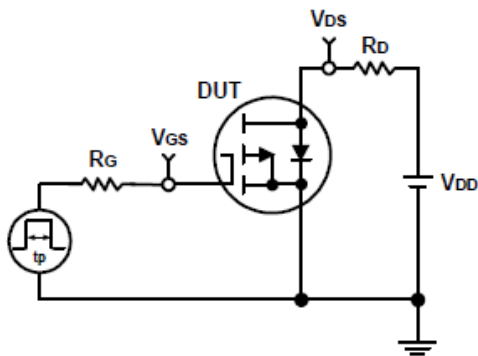
**Gate Charge**



### Avalanche Test Circuit and Waveforms



### Switching Time Test Circuit and Waveforms

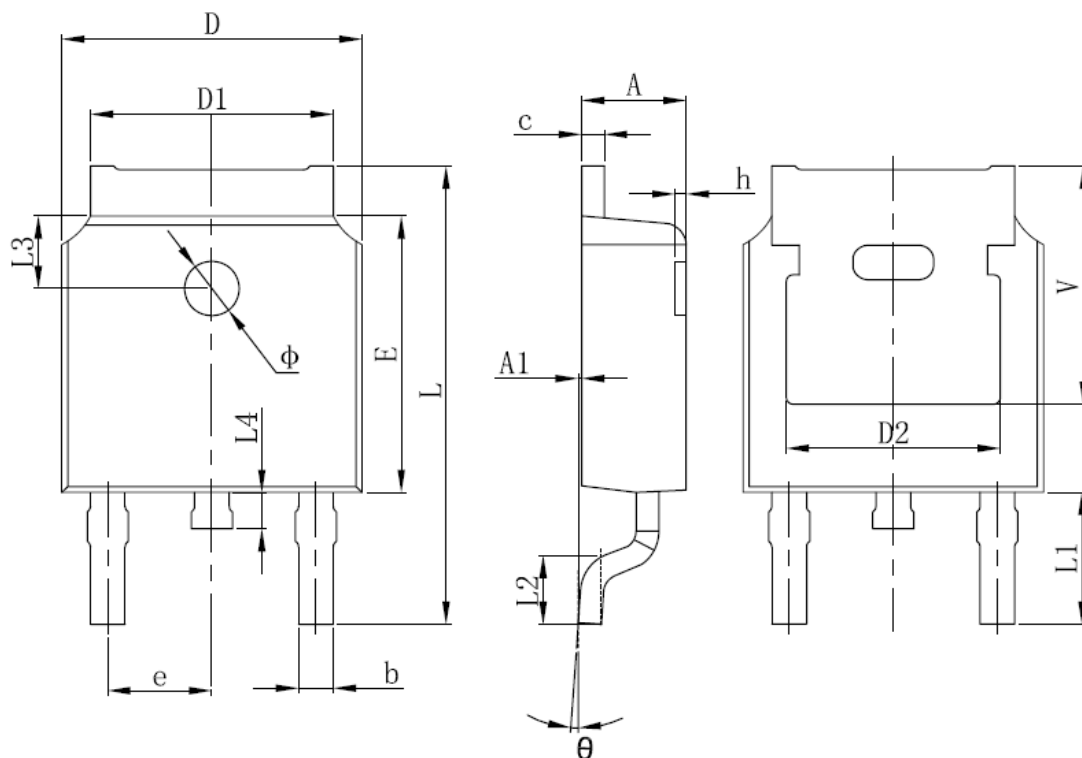


**Ordering and Marking Information**

<b>Device</b>	<b>Marking</b>	<b>Package</b>	<b>Packaging</b>	<b>Quantity</b>	<b>Reel Size</b>	<b>Tape width</b>
RU40L10L	RU40L10L	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.		0.063 REF.	
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**



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