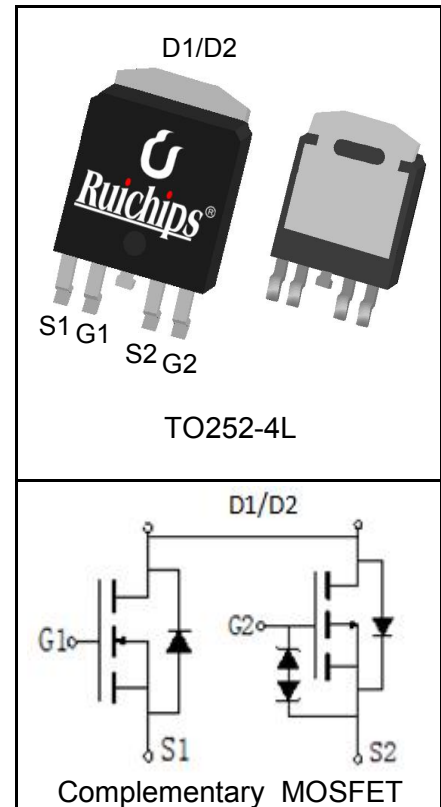


**Features**

- N-Channel  
40V/40A,  
 $R_{DS(ON)} = 13m\Omega(Typ.) @ V_{GS}=10V$   
 $R_{DS(ON)} = 16m\Omega(Typ.) @ V_{GS}=4.5V$
- P-Channel  
-40V/-40A,  
 $R_{DS(ON)} = 16m\Omega(Typ.) @ V_{GS}=-10V$   
 $R_{DS(ON)} = 25m\Omega(Typ.) @ V_{GS}=-4.5V$
- Fast Switching Speed
- Low gate Charge
- ESD protected
- Lead Free and Green Devices Available (RoHS Compliant)

**Applications**

- Load Switch

**Pin Description**

**Absolute Maximum Ratings**

Symbol	Parameter		N-Channel	P-Channel	Unit
<b>Common Ratings</b> ( $T_A=25^\circ C$ Unless Otherwise Noted)					
$V_{DSS}$	Drain-Source Voltage		40	-40	V
$V_{GSS}$	Gate-Source Voltage		$\pm 20$	$\pm 20$	
$T_J$	Maximum Junction Temperature		175	175	$^\circ C$
$T_{STG}$	Storage Temperature Range		-55 to 175	-55 to 175	$^\circ C$
$I_S$	Diode Continuous Forward Current	$T_A=25^\circ C$	40	-40	A
<b>Mounted on Large Heat Sink</b>					
$I_{DP}^{①}$	300 $\mu s$ Pulse Drain Current Tested	$T_C=25^\circ C$	160	-160	A
$I_D^{②}$	Continuous Drain Current( $V_{GS}=\pm 10V$ )	$T_C=25^\circ C$	40	-40	A
		$T_C=100^\circ C$	25	-25	
$P_D$	Maximum Power Dissipation	$T_C=25^\circ C$	73	67	W
		$T_C=100^\circ C$	37	34	
$R_{\theta JC}$	Thermal Resistance-Junction to Case		2.05	2.25	$^\circ C/W$
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient		100	100	$^\circ C/W$
<b>Drain-Source Avalanche Ratings</b>					
$E_{AS}^{④}$	Avalanche Energy, Single Pulsed		42	42	mJ

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

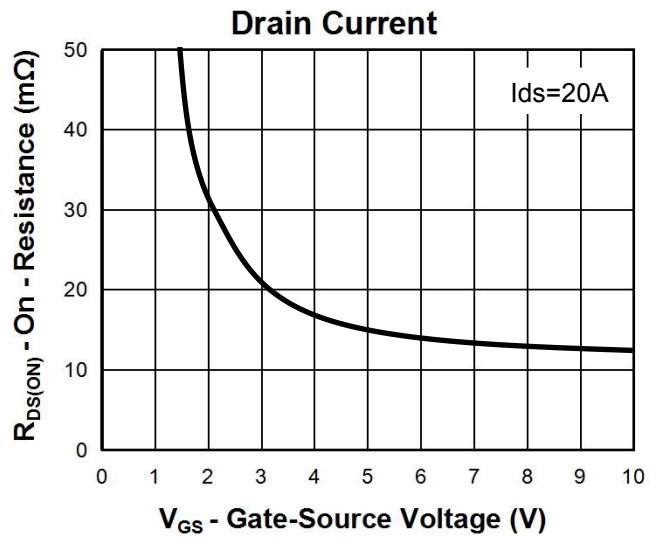
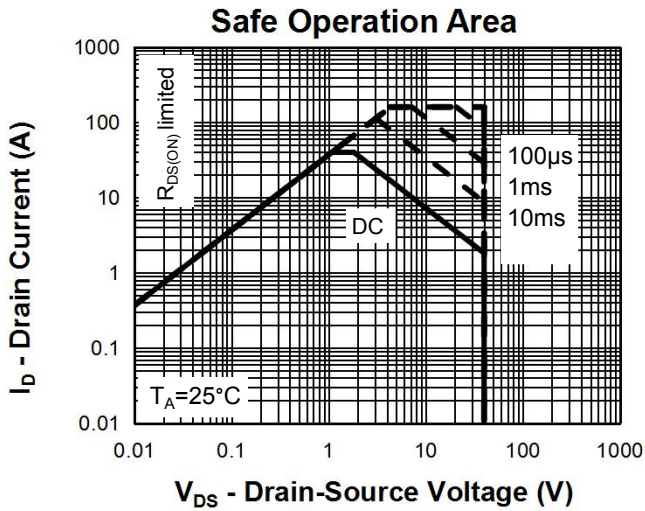
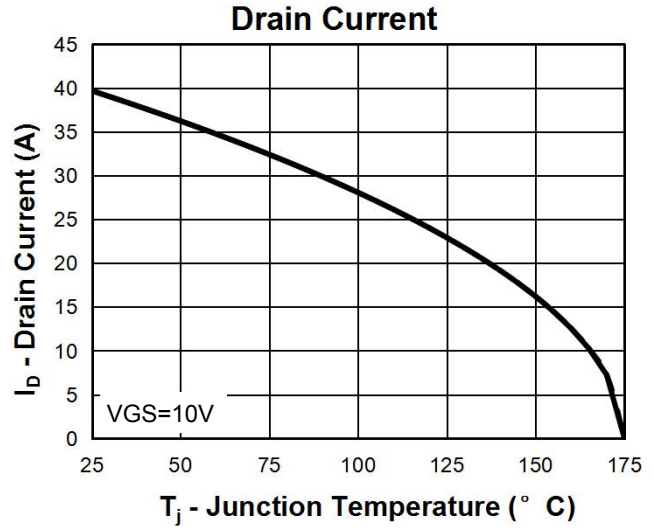
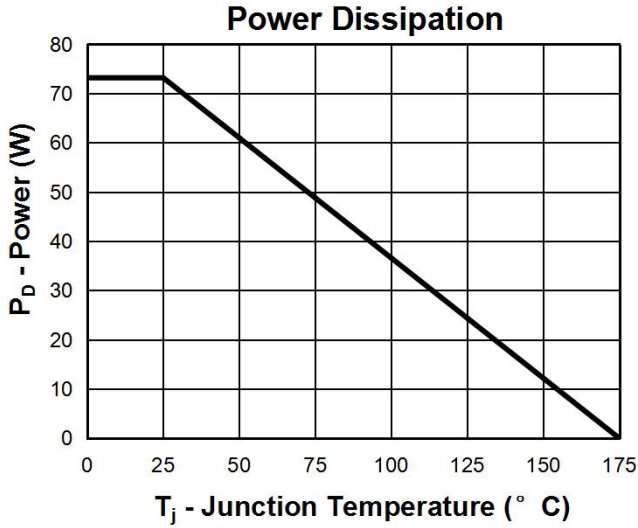
Symbol	Parameter	Test Condition	RU40C40L4			Unit
			Min.	Typ.	Max.	
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	N	40		V
		$V_{GS}=0V, I_{DS}=-250\mu A$	P	-40		
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=40V, V_{GS}=0V$	N		1	$\mu A$
		$T_J=125^\circ C$			30	
		$V_{DS}=-40V, V_{GS}=0V$	P		-1	
		$T_J=125^\circ C$			-30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	N	1	2.5	V
		$V_{DS}=V_{GS}, I_{DS}=-250\mu A$	P	-1	-2.5	
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	N		$\pm 1$	$\mu A$
		$V_{GS}=\pm 20V, V_{DS}=0V$	P		$\pm 10$	
$R_{DS(on)}^{(5)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=20A$	N		13	m $\Omega$
		$V_{GS}=-10V, I_{DS}=-20A$	P		16	
		$V_{GS}=4.5V, I_{DS}=16A$	N		16	
		$V_{GS}=-4.5V, I_{DS}=-16A$	P		25	
<b>Diode Characteristics</b>						
$V_{SD}^{(5)}$	Diode Forward Voltage	$I_{SD}=20A, V_{GS}=0V$	N		1.2	V
		$I_{SD}=-20A, V_{GS}=0V$	P		-1.3	
$t_{rr}$	Reverse Recovery Time	N-Channel $I_{SD}=20A, di_{SD}/dt=100A/\mu s$	N		15	ns
			P		36	
$Q_{rr}$	Reverse Recovery Charge	P-Channel $I_{SD}=-20A, di_{SD}/dt=100A/\mu s$	N		9	nC
			P		26	
<b>Dynamic Characteristics<sup>(6)</sup></b>						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1MHz$	N		1.2	$\Omega$
			P		1.5	
$C_{iss}$	Input Capacitance	N-Channel $V_{GS}=0V, V_{DS}=20V,$ Frequency=1.0MHz	N		740	pF
			P		2270	
$C_{oss}$	Output Capacitance	P-Channel $V_{GS}=0V, V_{DS}=-20V,$ Frequency=1.0MHz	N		190	
			P		245	
$C_{riss}$	Reverse Transfer Capacitance	$V_{GS}=0V, V_{DS}=-20V,$ Frequency=1.0MHz	N		75	
			P		135	

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

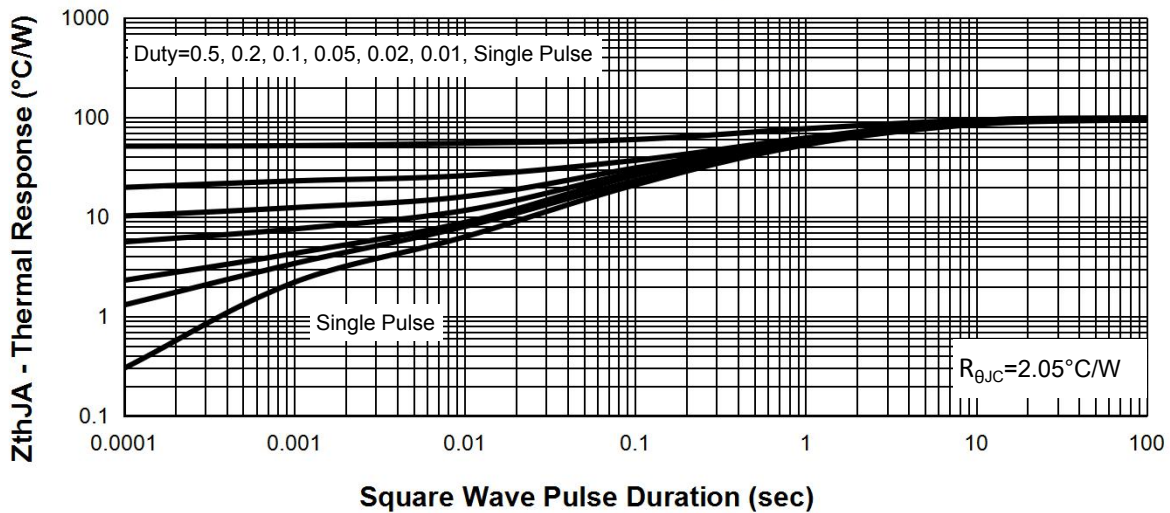
Symbol	Parameter	Test Condition	RU40C40L4			Unit	
			Min.	Typ.	Max.		
<b>Dynamic Characteristics</b> <sup>⑥</sup>							
$t_{d(ON)}$	Turn-on Delay Time	N-Channel $V_{DD}=20\text{V}, I_{DS}=20\text{A},$ $V_{GEN}=10\text{V}, R_G=4.7\Omega$  P-Channel $V_{DD}=-20\text{V}, I_{DS}=-20\text{A},$ $V_{GEN}= -10\text{V}, R_G=4.7\Omega$	N		6		ns
			P		15		
$t_r$	Turn-on Rise Time		N		11		
			P		28		
$t_{d(OFF)}$	Turn-off Delay Time		N		17		
			P		37		
$t_f$	Turn-off Fall Time		N		5		
			P		16		
<b>Gate Charge Characteristics</b> <sup>⑥</sup>							
$Q_g$	Total Gate Charge	N-Channel $V_{DS}=32\text{V}, V_{GS}=10\text{V},$ $I_{DS}=20\text{A}$  P-Channel $V_{DS}=-32\text{V}, V_{GS}= -10\text{V},$ $I_{DS}=-20\text{A}$	N		16		nC
			P		42		
$Q_{gs}$	Gate-Source Charge		N		3.5		
			P		9		
$Q_{gd}$	Gate-Drain Charge		N		5		
			P		14		

- Notes:**
- ① Pulse width limited by safe operating area.
  - ② Calculated continuous current based on maximum allowable junction temperature.
  - ③ When mounted on 1 inch square copper board,  $t \leq 10\text{sec}$ .
  - ④ Limited by  $T_{Jmax}$ ,  $I_{AS} = 13\text{A}$ ,  $V_{DD} = 24\text{V}$ ,  $R_G = 50\Omega$ , Starting  $T_J = 25^{\circ}\text{C}$ .
  - ⑤ Pulse test ; Pulse width 300s, duty cycle 2%.
  - ⑥ Guaranteed by design, not subject to production testing.

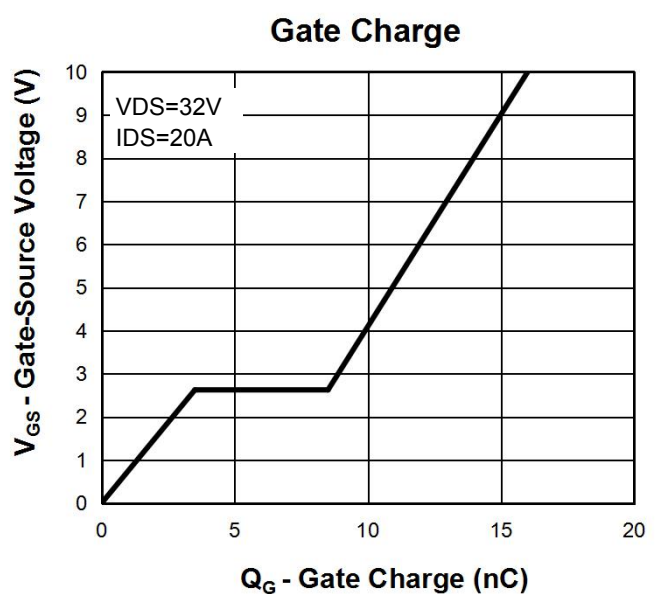
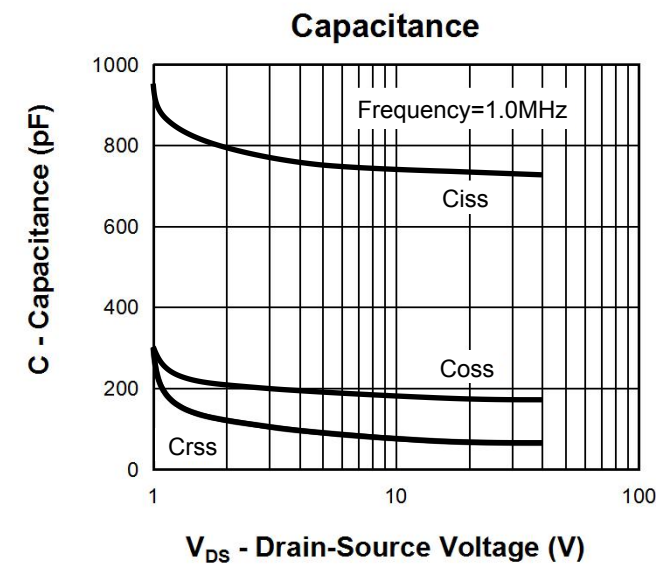
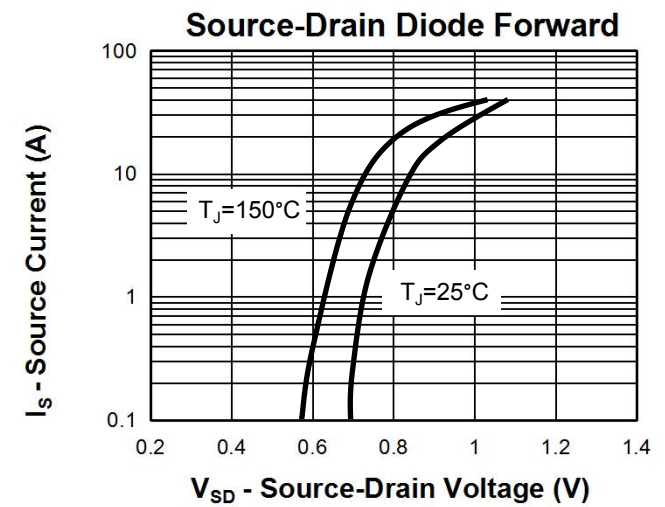
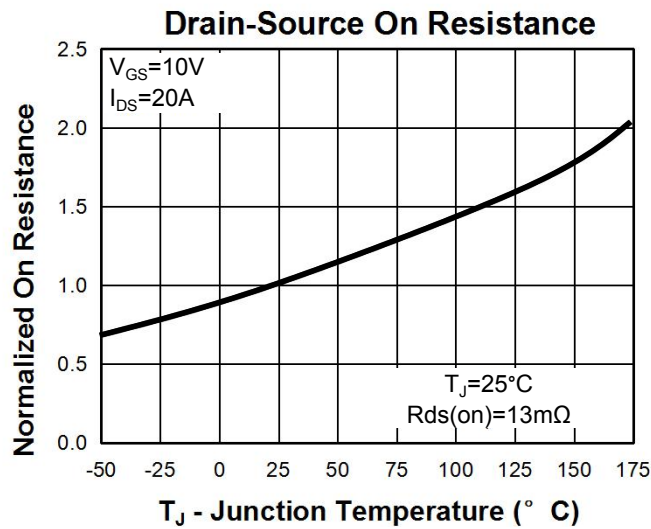
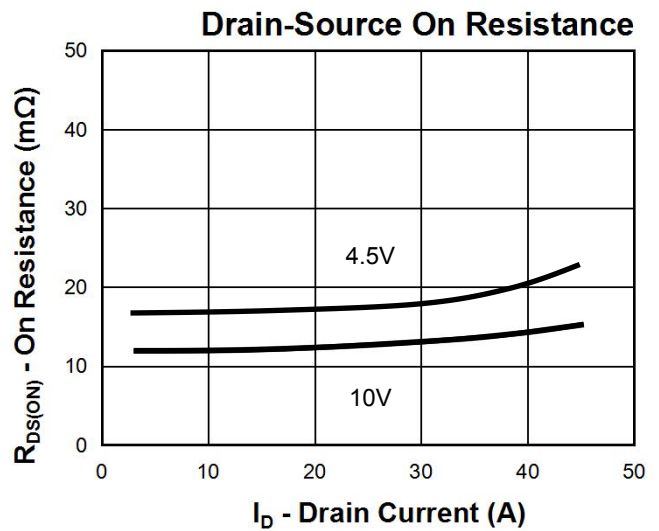
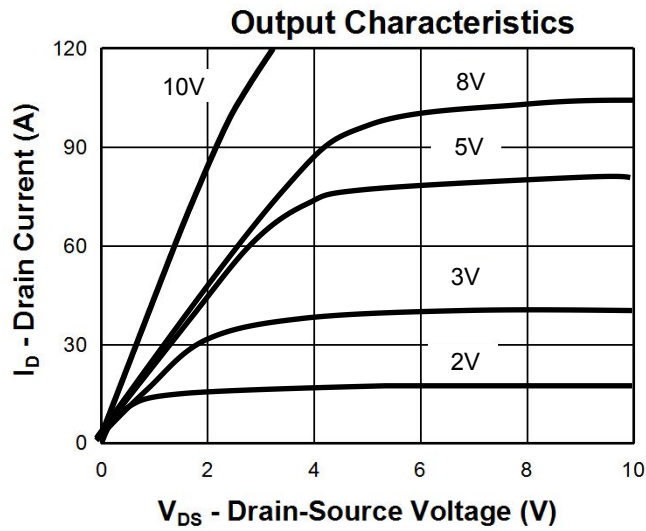
**Typical Characteristics(N-Channel)**



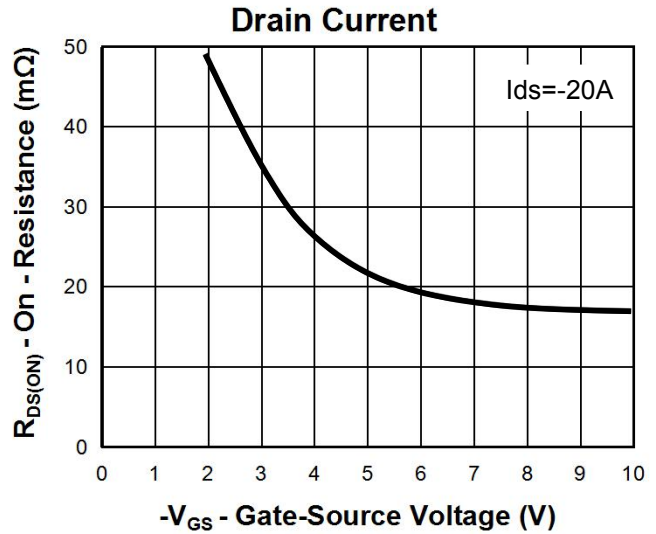
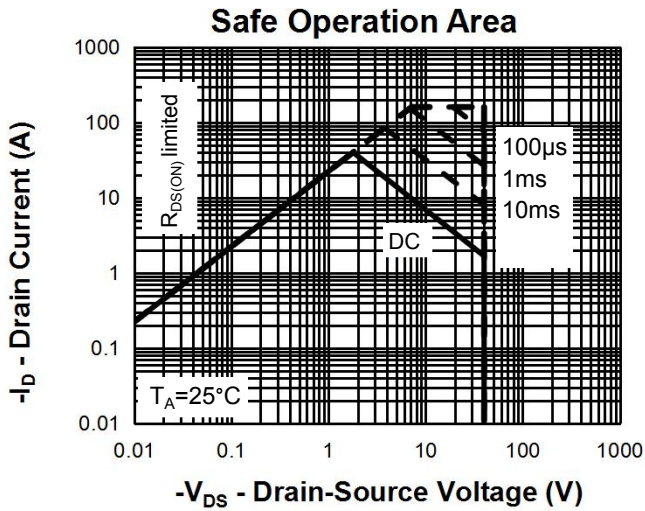
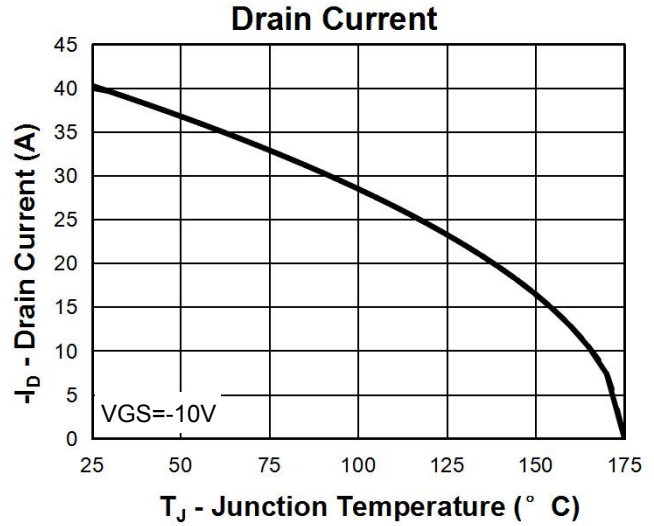
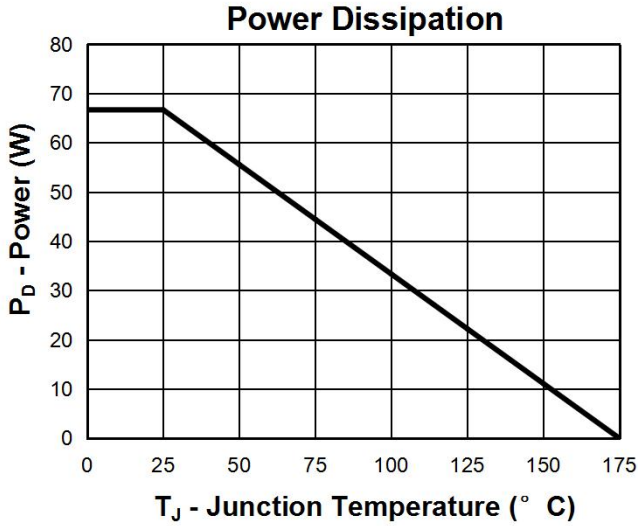
**Thermal Transient Impedance**



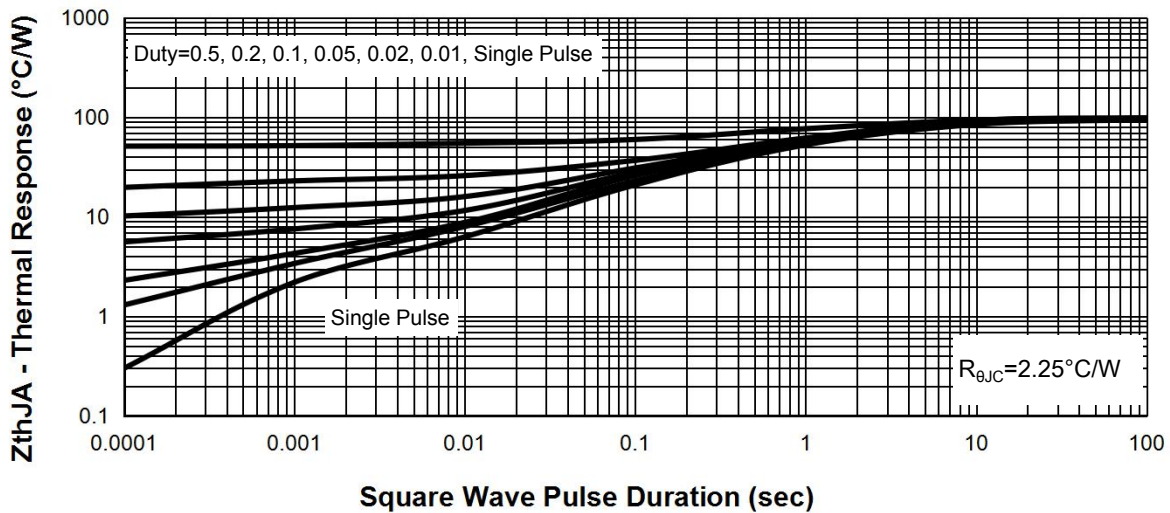
**Typical Characteristics(N-Channel)**



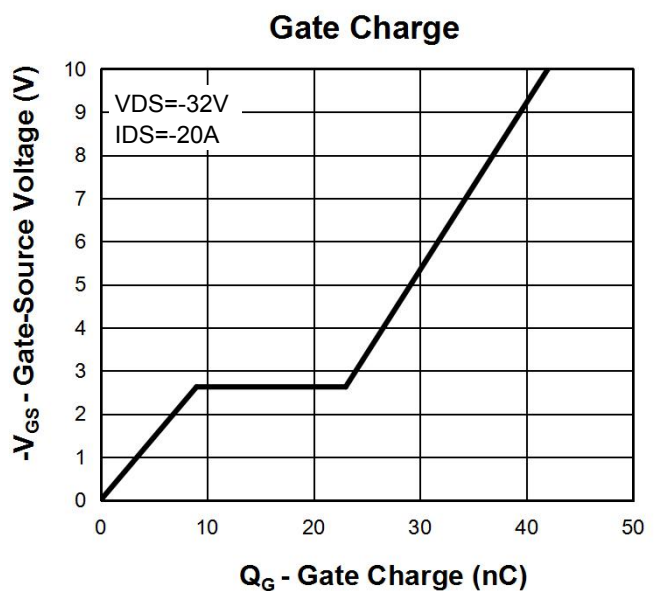
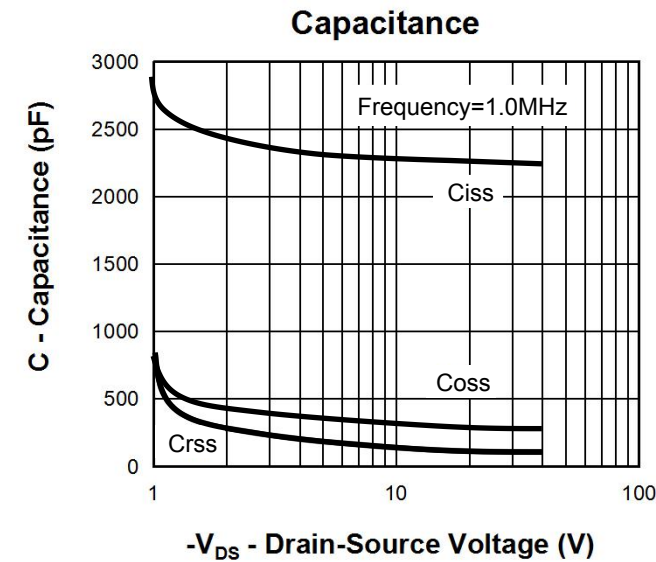
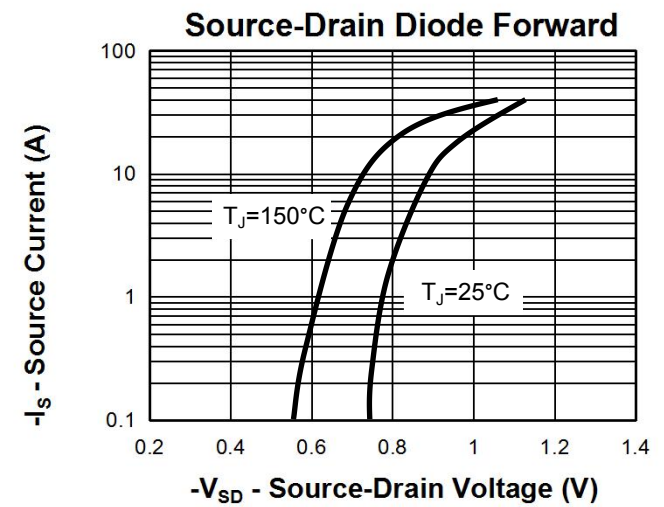
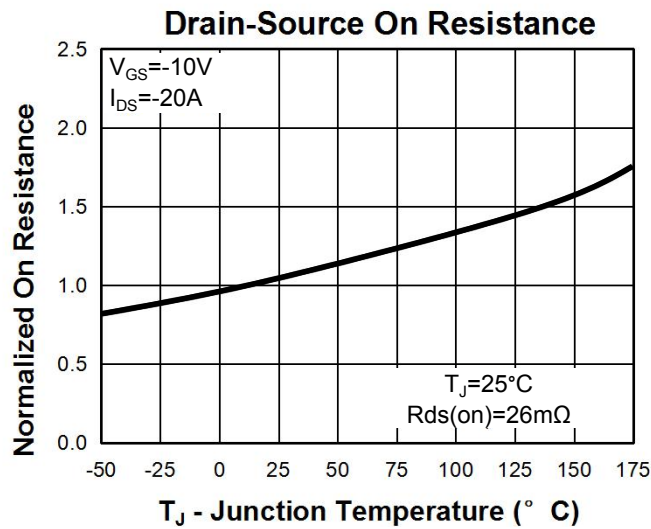
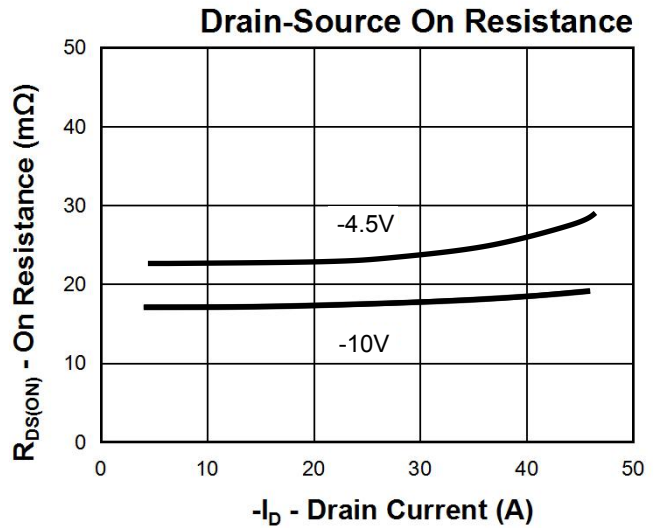
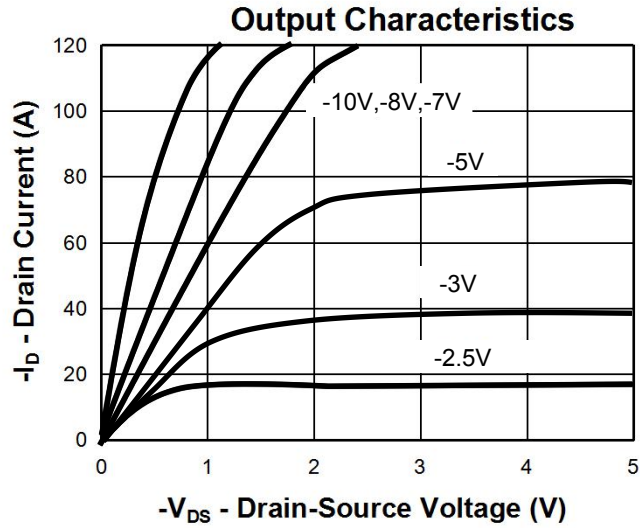
**Typical Characteristics(P-Channel)**



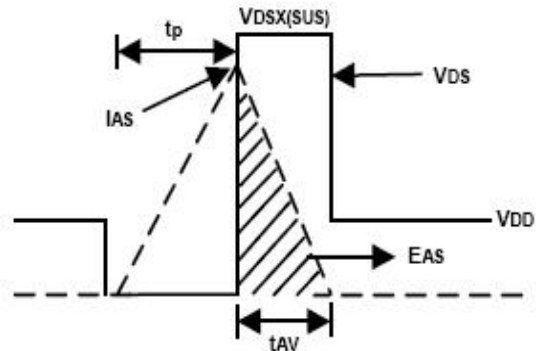
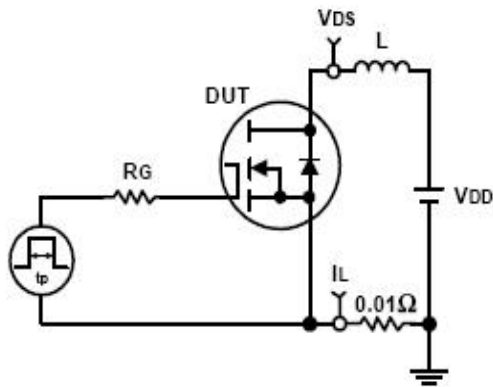
**Thermal Transient Impedance**



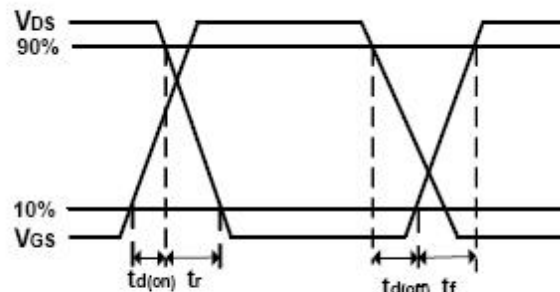
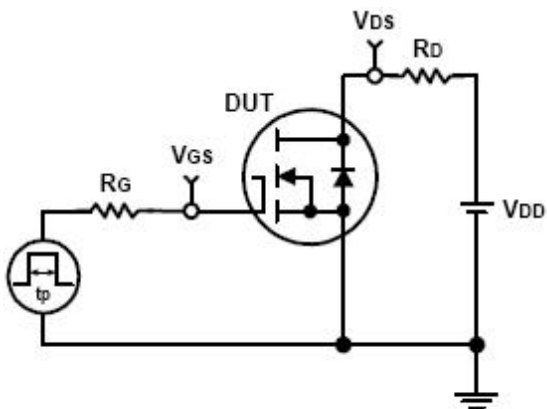
**Typical Characteristics(P-Channel)**



**Avalanche Test Circuit and Waveforms**



**Switching Time Test Circuit and Waveforms**



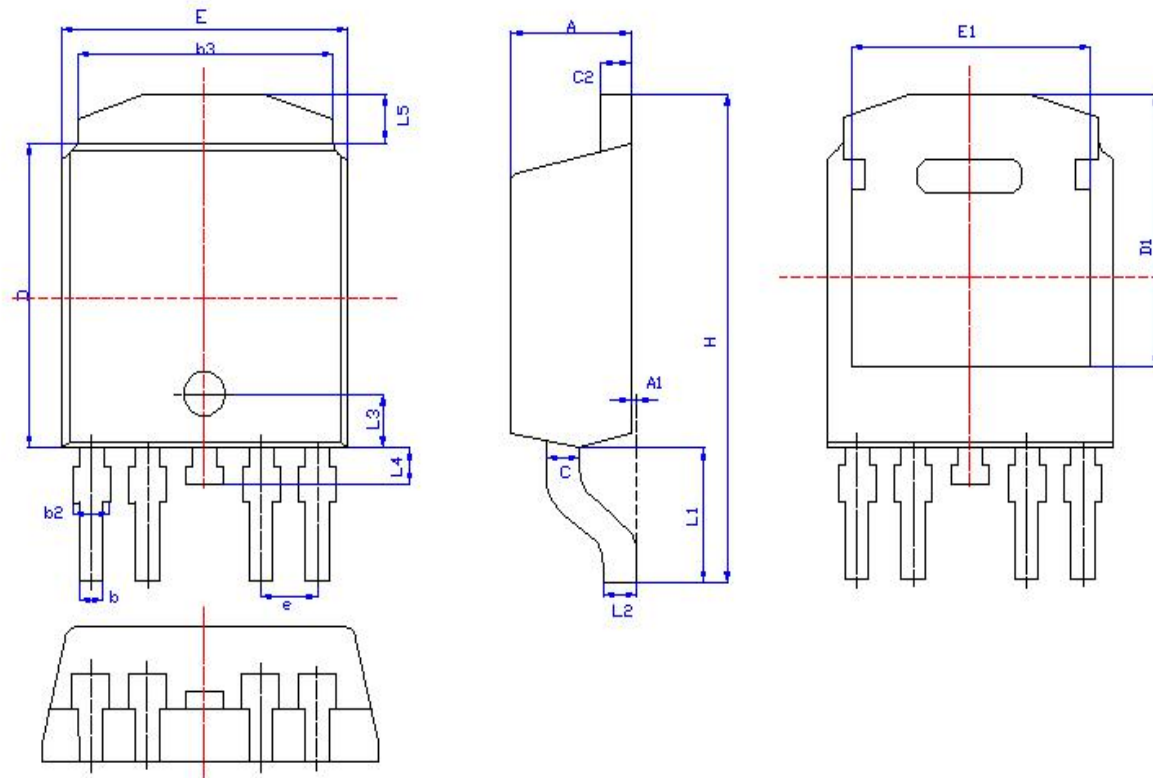
**Ordering and Marking Information**

Device	Marking	Package	Packaging	Quantity	Reel Size	Tape width
RU40C40L4	RU40C40L	TO252	Tape&Reel	2500	13"	16mm



**Package Information**

**TO252-4L**



**NOTE:**

- 1: ALL UNITS ARE IN MILLIMETER.
- 2: EJECTOR PIN MARK POSITION MAY VARY FROM DIFFERENT MOLD.
- 3: ALL DIMENSIONS REFER TO JEDEC.DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.

SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	2.18	2.29	2.39	0.086	0.090	0.094
A1	0.00	0.06	0.13	0.000	0.003	0.005
b	0.51	0.61	0.71	0.020	0.024	0.028
b1	0.51	0.58	0.66	0.020	0.023	0.026
b2	0.61	0.70	0.79	0.024	0.028	0.031
b3	5.18	5.32	5.46	0.204	0.210	0.215
c	2.10	2.20	2.30	0.083	0.087	0.091
c1	0.41	0.50	0.60	0.016	0.020	0.024
c2	0.41	0.51	0.61	0.016	0.020	0.024
D	6.00	6.11	6.22	0.236	0.241	0.245
D1	5.05	/	/	0.199	/	/
E	6.35	6.54	6.73	0.250	0.258	0.265
E1	4.32	/	/	0.170	/	/
e	1.17	1.27	1.37	0.046	0.050	0.054
H	9.50	9.90	10.30	0.374	0.390	0.406
L	1.40	1.59	1.78	0.055	0.063	0.070
L1	2.40	2.70	3.00	0.094	0.106	0.118
L2	0.508REF			0.020REF		
L3	1.60	1.80	2.00	0.063	0.071	0.079
L4	/	/	1.02	/	/	0.040
L5	0.89	1.08	1.27	0.035	0.043	0.050