

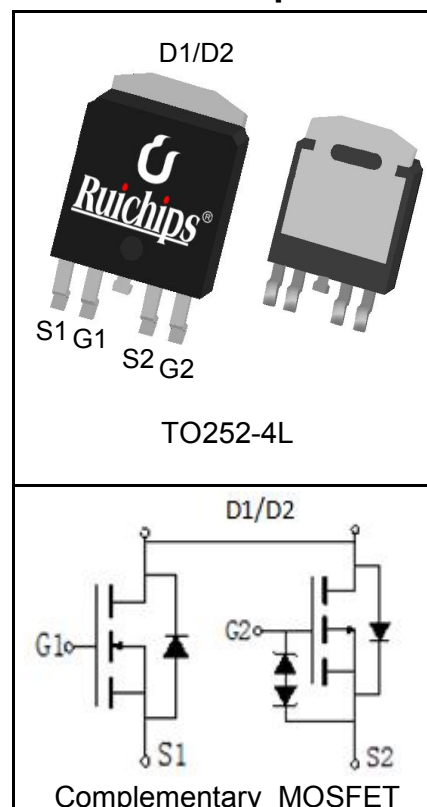
Features

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

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

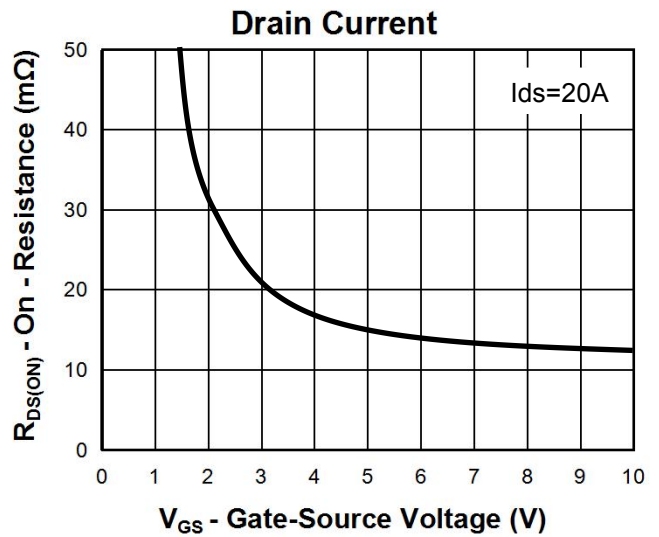
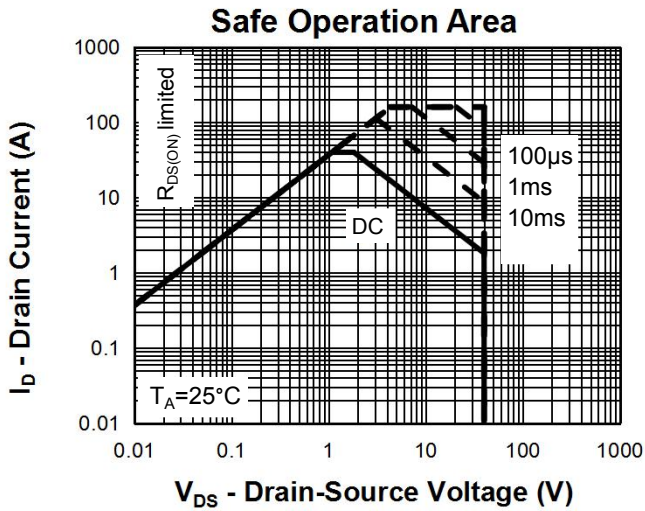
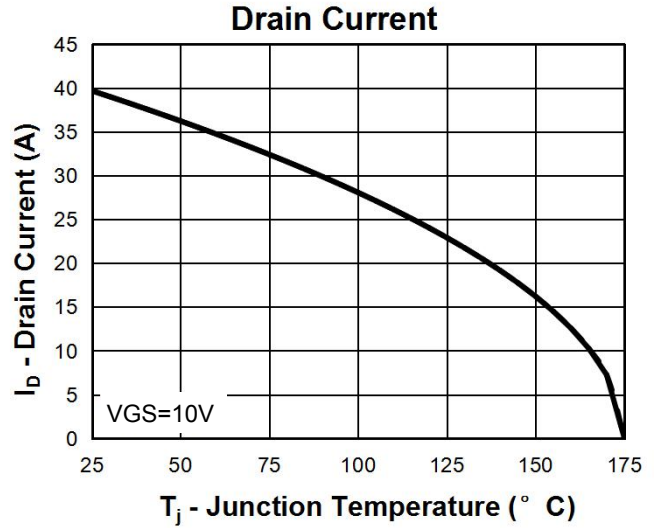
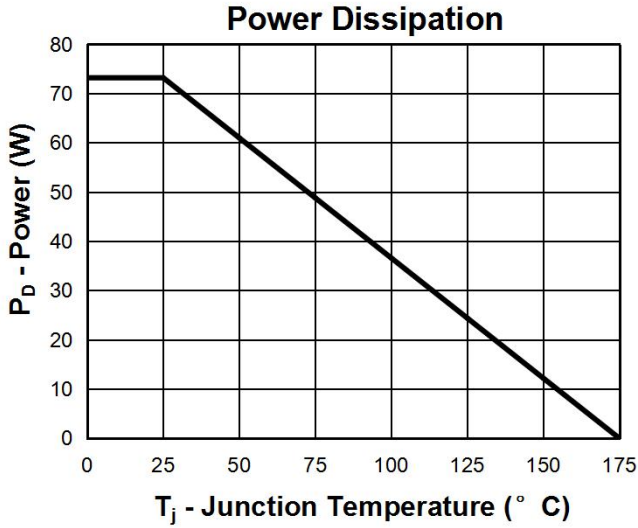
Symbol	Parameter	Test Condition	RU40C40L4			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	N	40		V
		$V_{GS}=0V, I_{DS}=-250\mu A$	P	-40		
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=40V, V_{GS}=0V$	N		1	μA
		$T_J=125^\circ C$			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		± 1	μA
		$V_{GS}=\pm 20V, V_{DS}=0V$	P		± 10	
$R_{DS(on)}^{(5)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=20A$	N	13	16	m Ω
		$V_{GS}=-10V, I_{DS}=-20A$	P	16	22	
		$V_{GS}=4.5V, I_{DS}=16A$	N	16	22	
		$V_{GS}=-4.5V, I_{DS}=-16A$	P	25	32	
Diode Characteristics						
$V_{SD}^{(5)}$	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		
Dynamic Characteristics⁽⁶⁾						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1MHz$	N	1.2		Ω
			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	N	190		
			P	245		
C_{rss}	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)

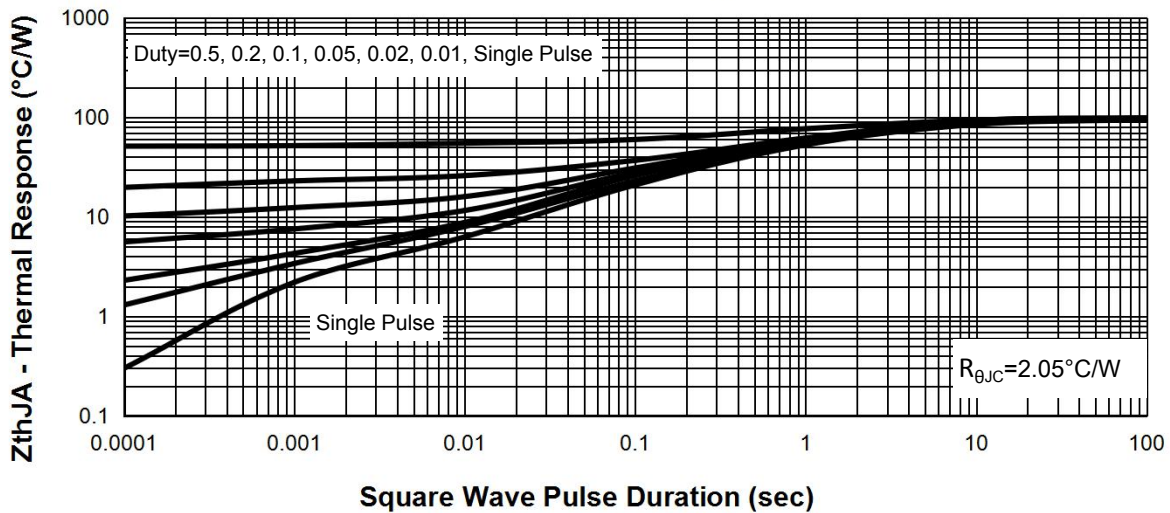
Symbol	Parameter	Test Condition	RU40C40L4			Unit	
			Min.	Typ.	Max.		
Dynamic Characteristics ^⑥							
$t_{d(\text{ON})}$	Turn-on Delay Time	N-Channel $V_{\text{DD}}=20\text{V}$, $I_{\text{DS}}=20\text{A}$, $V_{\text{GEN}}=10\text{V}$, $R_{\text{G}}=4.7\Omega$ P-Channel $V_{\text{DD}}=-20\text{V}$, $I_{\text{DS}}=-20\text{A}$, $V_{\text{GEN}}=-10\text{V}$, $R_{\text{G}}=4.7\Omega$	N		6		ns
			P		15		
t_r	Turn-on Rise Time		N		11		
			P		28		
$t_{d(\text{OFF})}$	Turn-off Delay Time		N		17		
			P		37		
t_f	Turn-off Fall Time		N		5		
			P		16		
Gate Charge Characteristics ^⑥							
Q_g	Total Gate Charge	N-Channel $V_{\text{DS}}=32\text{V}$, $V_{\text{GS}}=10\text{V}$, $I_{\text{DS}}=20\text{A}$ P-Channel $V_{\text{DS}}=-32\text{V}$, $V_{\text{GS}}=-10\text{V}$, $I_{\text{DS}}=-20\text{A}$	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} , $I_{\text{AS}}=13\text{A}$, $V_{\text{DD}}=24\text{V}$, $R_{\text{G}}=50\Omega$, Starting $T_{\text{J}}=25^{\circ}\text{C}$.
 - ⑤ Pulse test ; Pulse width 300s, duty cycle 2%.
 - ⑥ Guaranteed by design, not subject to production testing.

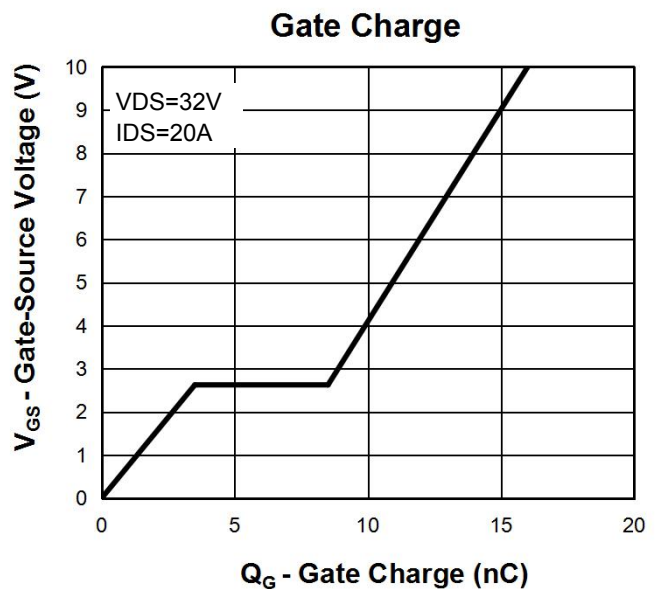
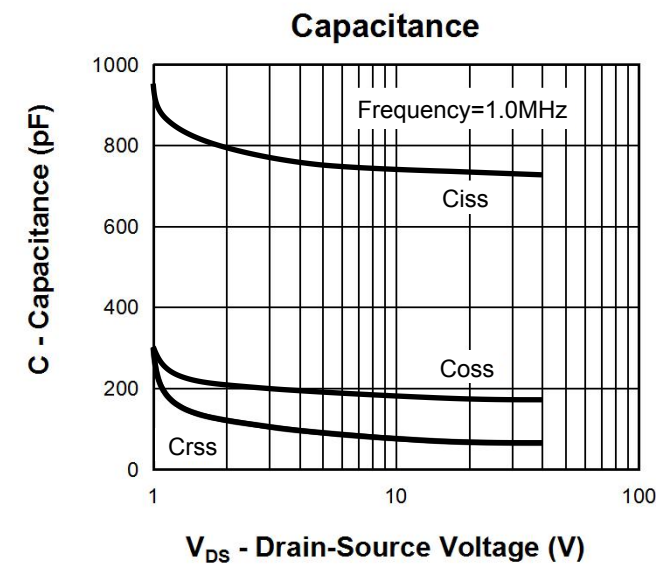
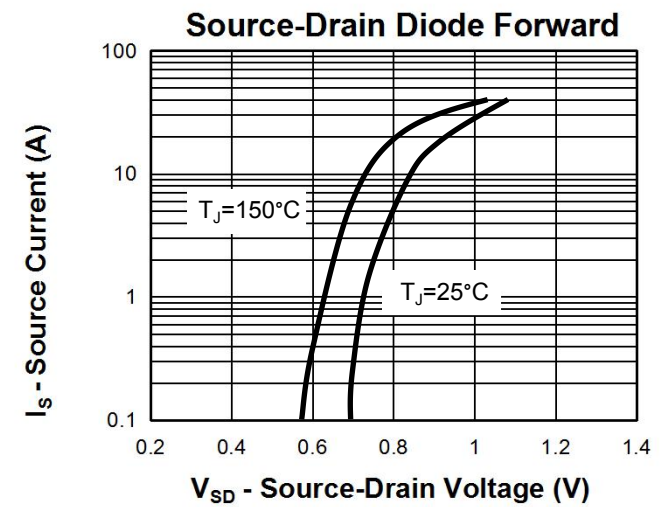
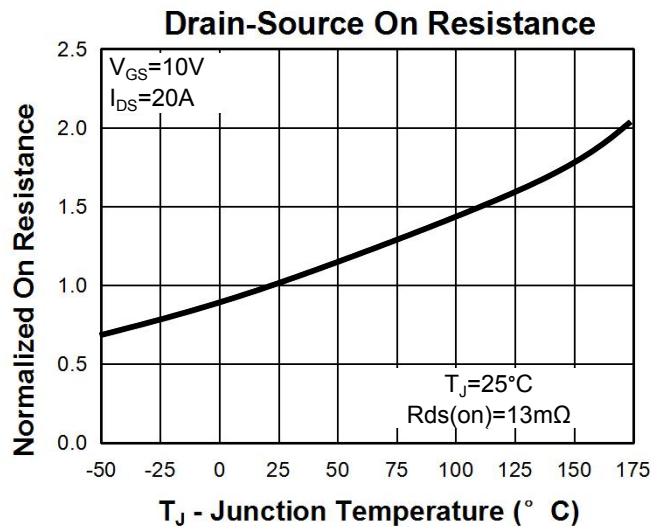
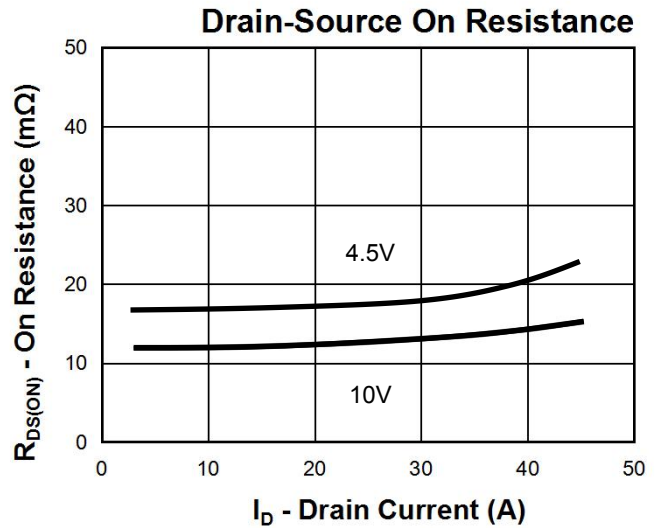
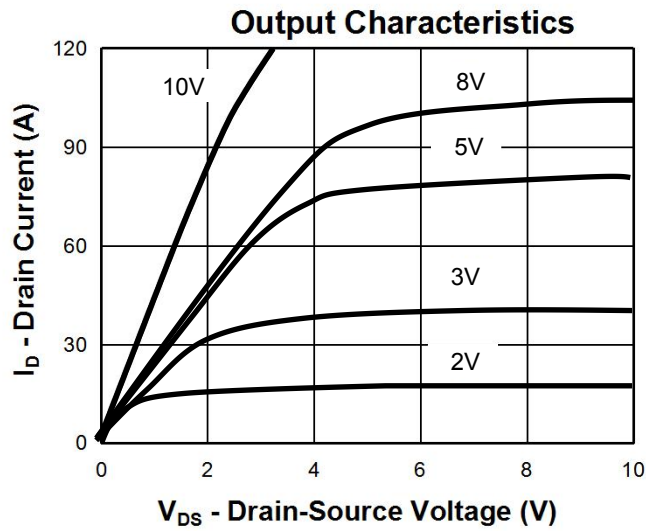
Typical Characteristics(N-Channel)



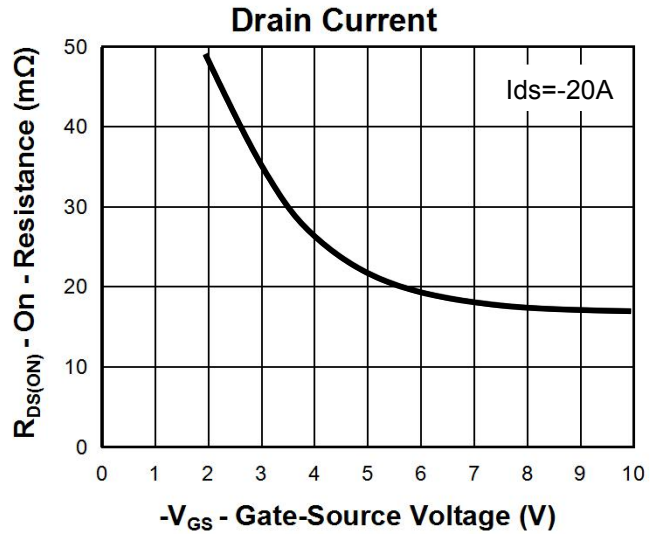
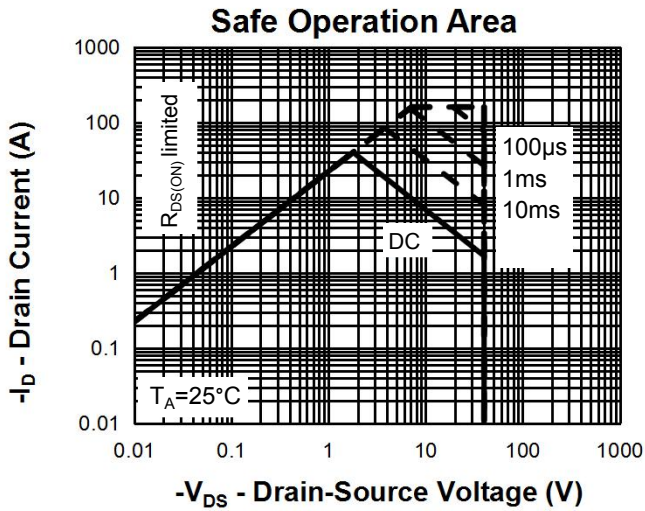
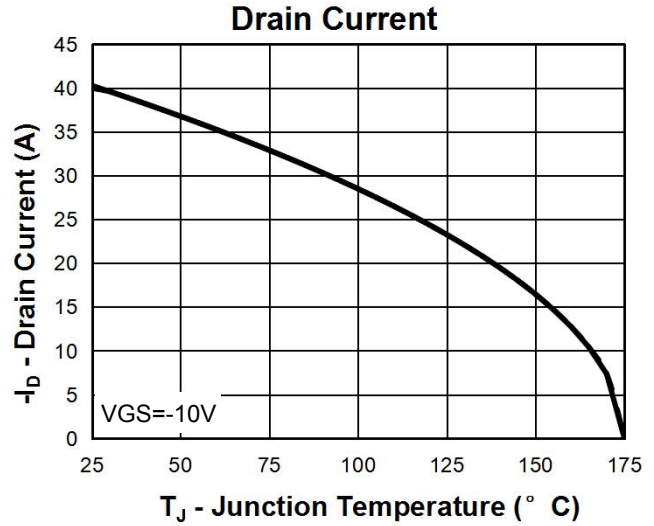
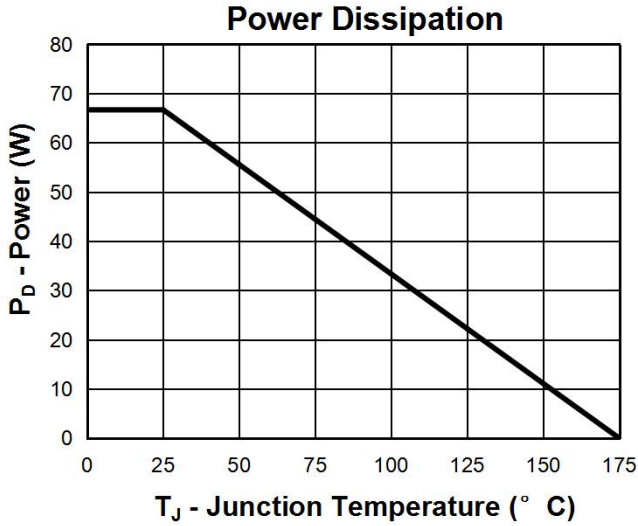
Thermal Transient Impedance



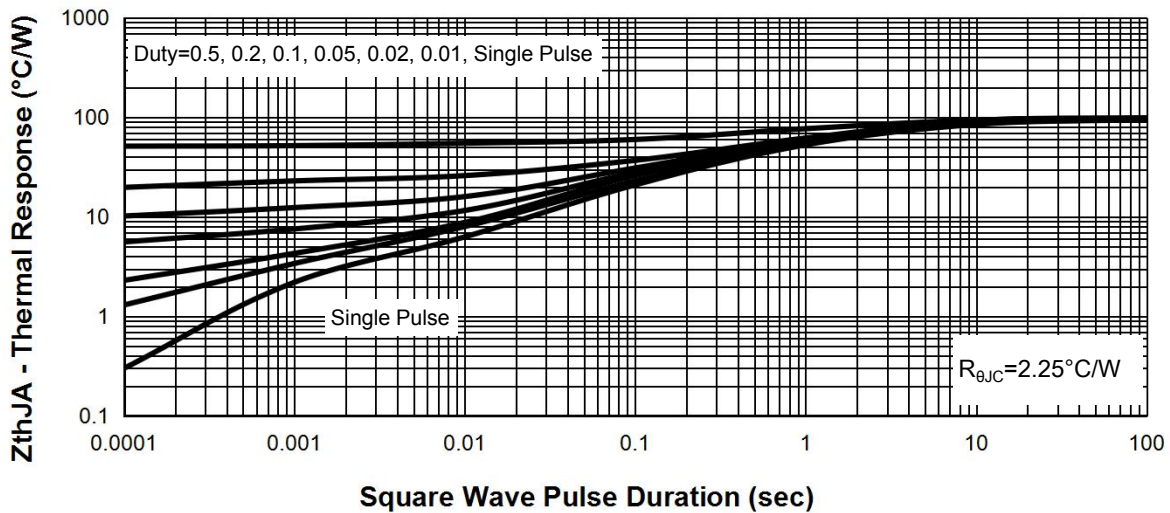
Typical Characteristics(N-Channel)



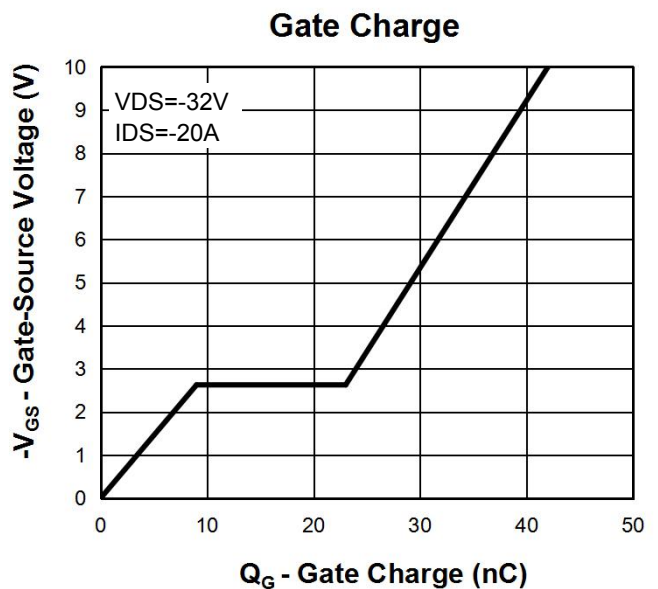
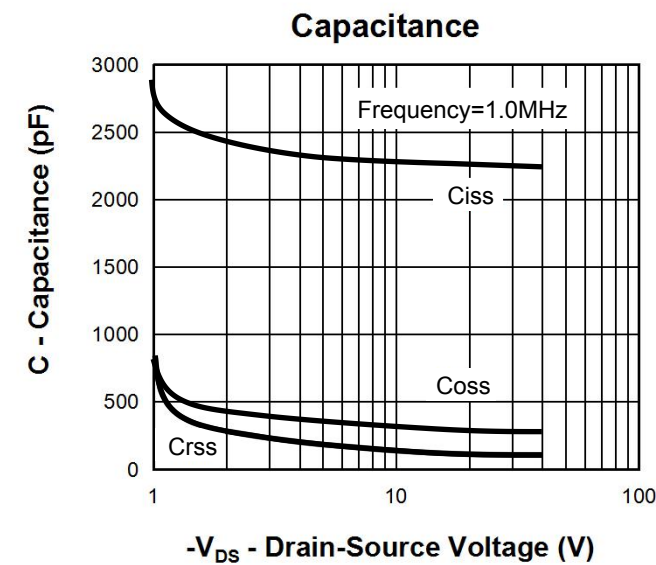
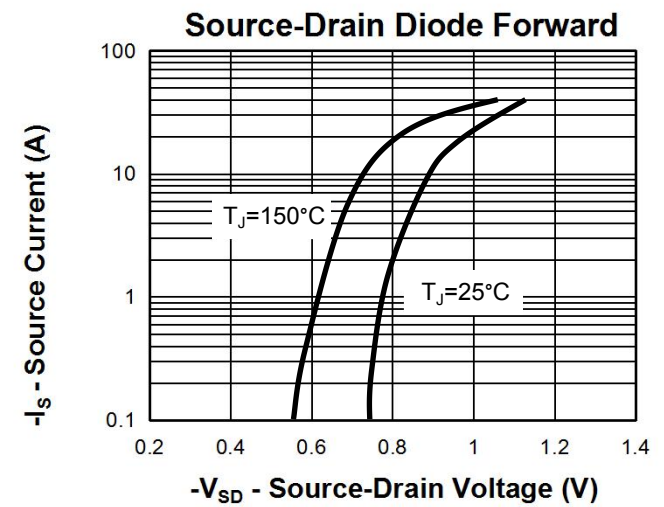
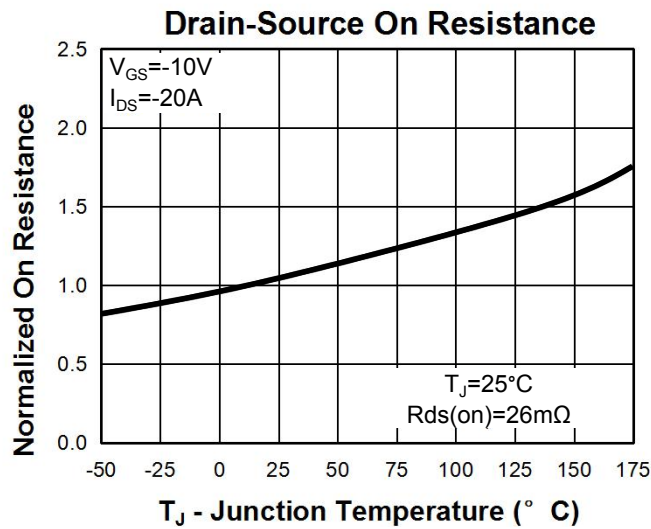
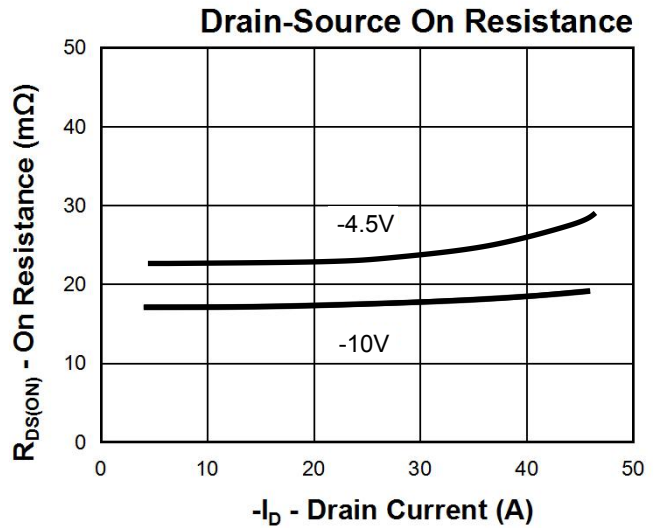
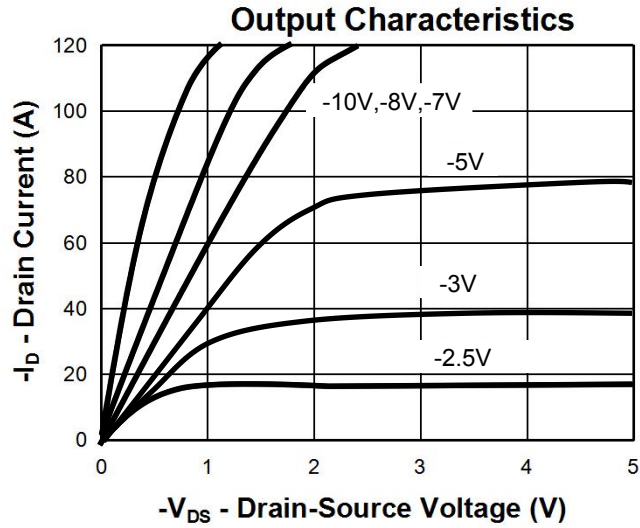
Typical Characteristics(P-Channel)



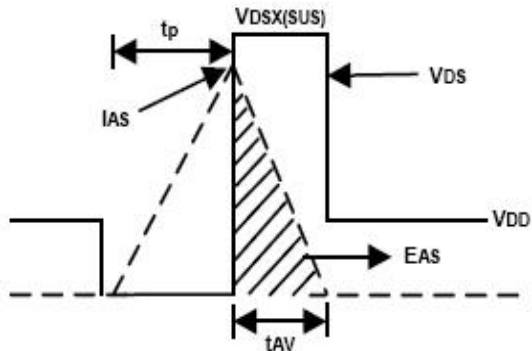
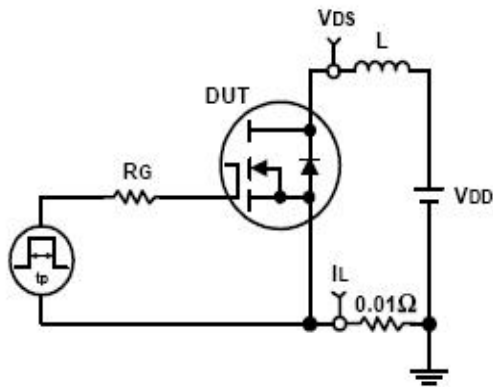
Thermal Transient Impedance



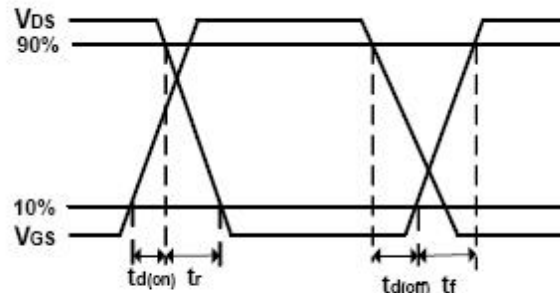
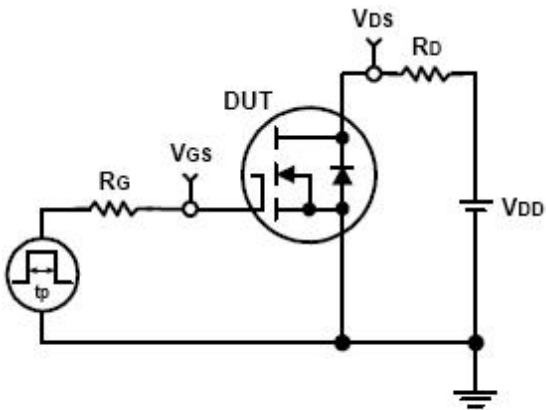
Typical Characteristics(P-Channel)



Avalanche Test Circuit and Waveforms



Switching Time Test Circuit and Waveforms

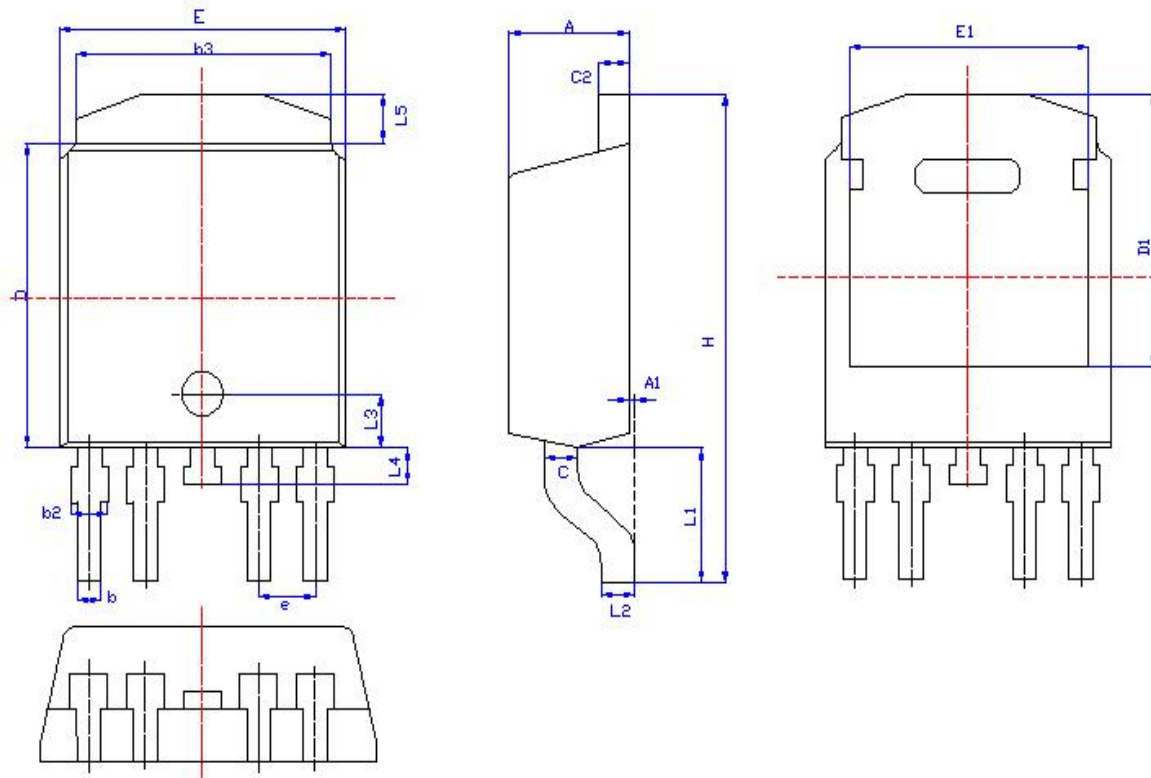


Ordering and Marking Information

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

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