

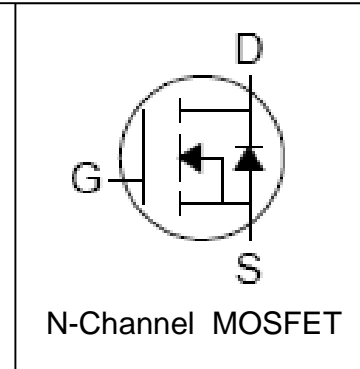
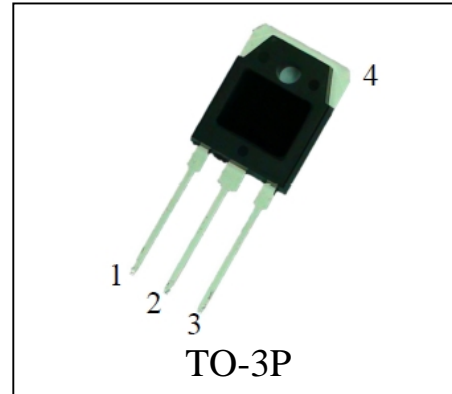
Features

- 40V/230A,
 $R_{DS(ON)} = 2.3m$ (Typ.)@ $V_{GS} = 10V$
 $R_{DS(ON)} = 3.5m$ (Typ.)@ $V_{GS} = 4.5V$
- Super High Dense Cell Design
- Ultra Low On-Resistance
- 100% avalanche tested
- Lead Free and Green Devices Available
 (RoHS Compliant)

Applications

- DC-DC Converters and Off-line UPS
- Switching Applications

Pin Description



Absolute Maximum Ratings

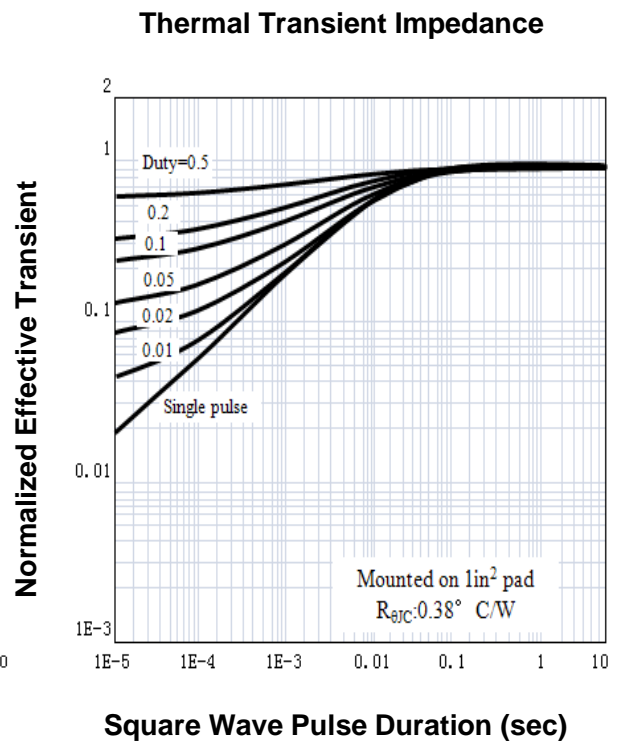
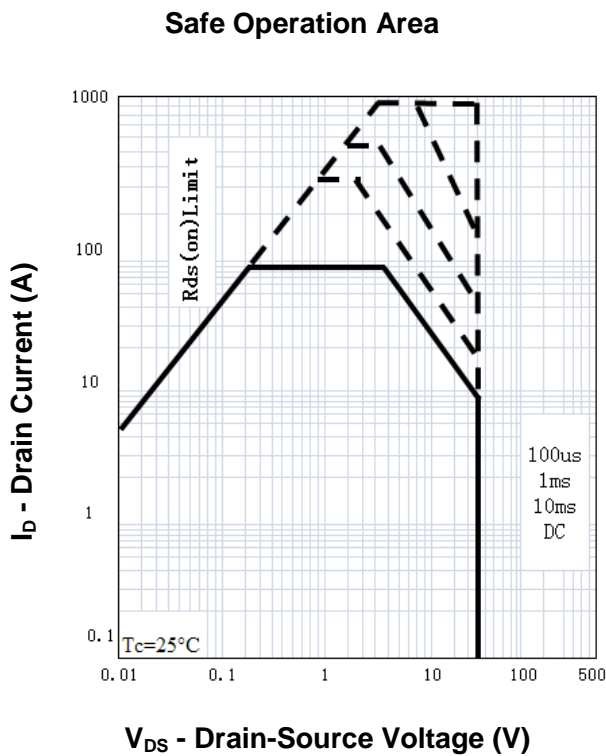
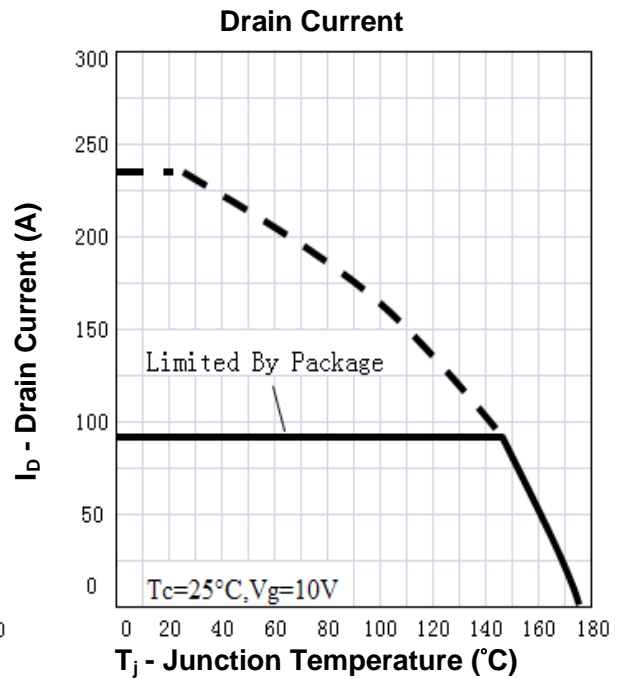
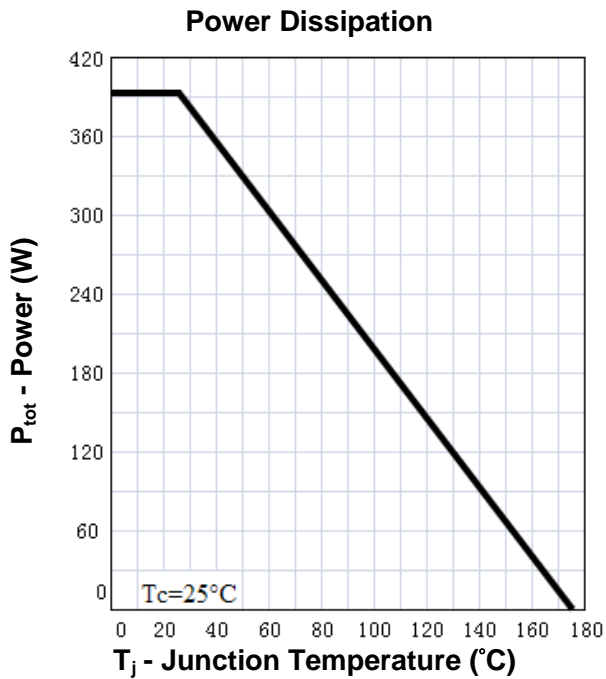
Symbol	Parameter	Rating	Unit
Common Ratings ($T_C = 25^\circ\text{C}$ Unless Otherwise Noted)			
V_{DSS}	Drain-Source Voltage	40	V
V_{GSS}	Gate-Source Voltage	± 20	
T_J	Maximum Junction Temperature	175	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ\text{C}$
I_S	Diode Continuous Forward Current	$T_C = 25^\circ\text{C}$ 230 ^①	A
Mounted on Large Heat Sink			
I_{DP}	300 μs Pulse Drain Current Tested	$T_C = 25^\circ\text{C}$ 920 ^②	A
I_D	Continuous Drain Current ($V_{GS} = 10V$)	$T_C = 25^\circ\text{C}$ 230 ^①	A
		$T_C = 100^\circ\text{C}$ 164	
P_D	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$ 394	W
		$T_C = 100^\circ\text{C}$ 197	W
$R_{\theta JC}$	Thermal Resistance-Junction to Case	0.38	$^\circ\text{C/W}$
Drain-Source Avalanche Ratings			
E_{AS} ^③	Avalanche Energy, Single Pulsed	576	mJ

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

Symbol	Parameter	Test Condition	RU40231Q2			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	40			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=40V, V_{GS}=0V$ $T_J=85^\circ\text{C}$			1 30	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	1	-	3	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$			± 100	nA
$R_{DS(ON)}^{(4)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=75A$		2.3	3	m Ω
		$V_{GS}=4.5V, I_{DS}=50A$		3.5	5	m Ω
Diode Characteristics						
$V_{SD}^{(4)}$	Diode Forward Voltage	$I_{SD}=75A, V_{GS}=0V$			1.2	V
t_{rr}	Reverse Recovery Time	$I_{SD}=75A, dI_{SD}/dt=100A/\mu s$		56		ns
Q_{rr}	Reverse Recovery Charge			102		nC
Dynamic Characteristics ⁽⁵⁾						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$		1.5		Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=20V,$ Frequency=1.0MHz		4900		pF
C_{oss}	Output Capacitance			1030		
C_{rss}	Reverse Transfer Capacitance			220		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=20V, R_L=0.3\Omega,$ $I_{DS}=75A, V_{GEN}=10V,$ $R_G=2.5\Omega$		20		ns
t_r	Turn-on Rise Time			98		
$t_{d(OFF)}$	Turn-off Delay Time			105		
t_f	Turn-off Fall Time			52		
Gate Charge Characteristics ⁽⁵⁾						
Q_g	Total Gate Charge	$V_{DS}=32V, V_{GS}=10V,$ $I_{DS}=75A$		90		nC
Q_{gs}	Gate-Source Charge			26		
Q_{gd}	Gate-Drain Charge			30		

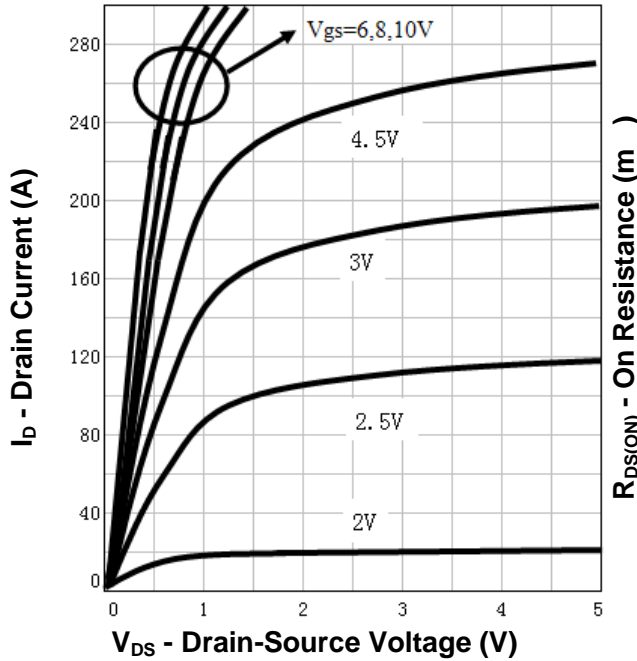
- Notes: ① Calculated continuous current based on maximum allowable junction temperature. The package limitation current is 90A.
 ② Pulse width limited by safe operating area.
 ③ Limited by $T_{Jmax}, I_{AS}=48A, V_{DD}=32V, R_G=50\Omega$, Starting $T_J=25^\circ\text{C}$.
 ④ Pulse test; Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
 ⑤ Guaranteed by design, not subject to production testing.

Typical Characteristics

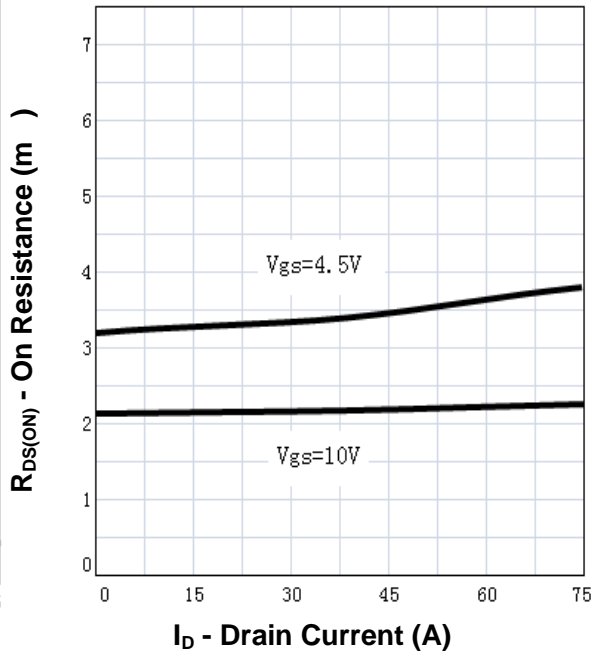


Typical Characteristics

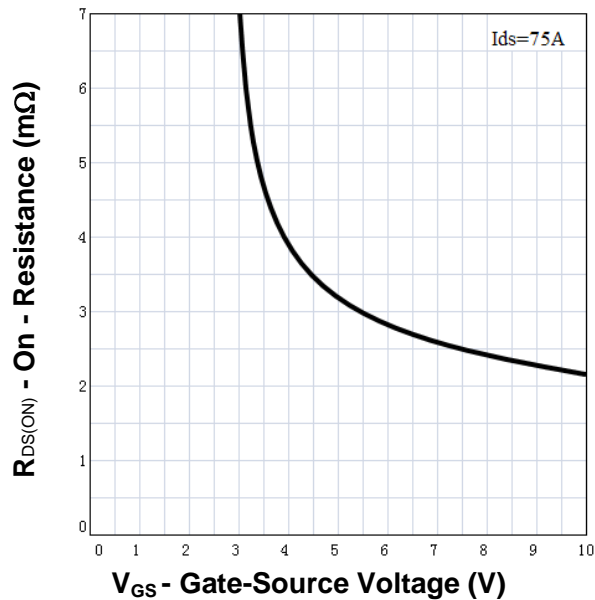
Output Characteristics



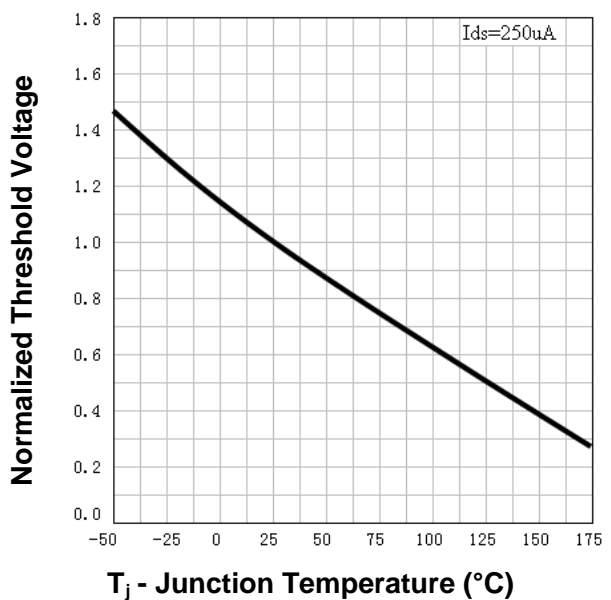
Drain-Source On Resistance



Drain-Source On Resistance

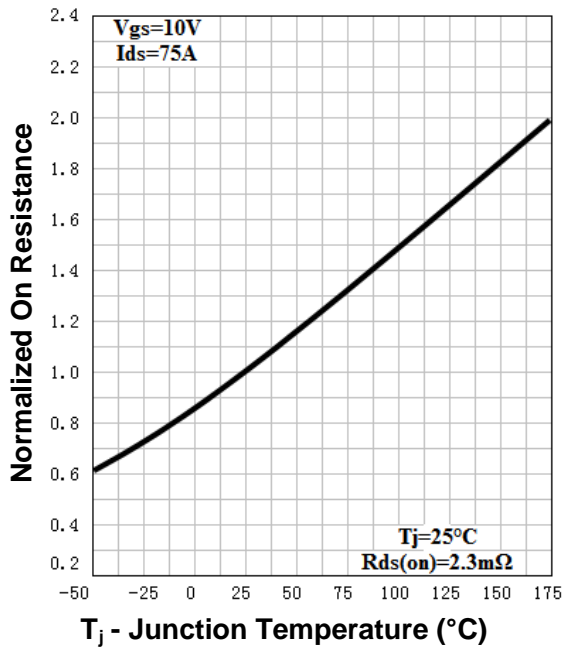


Gate Threshold Voltage

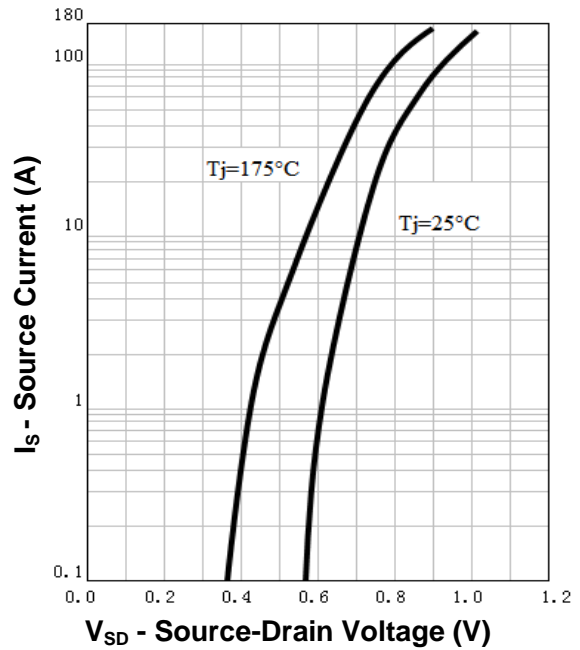


Typical Characteristics

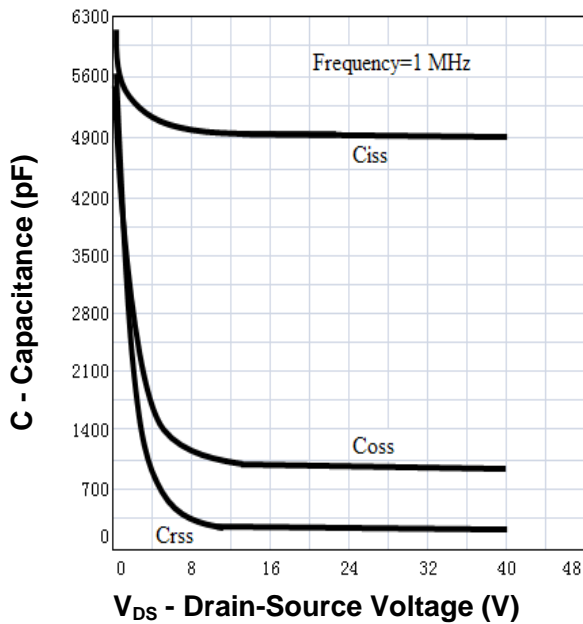
Drain-Source On Resistance



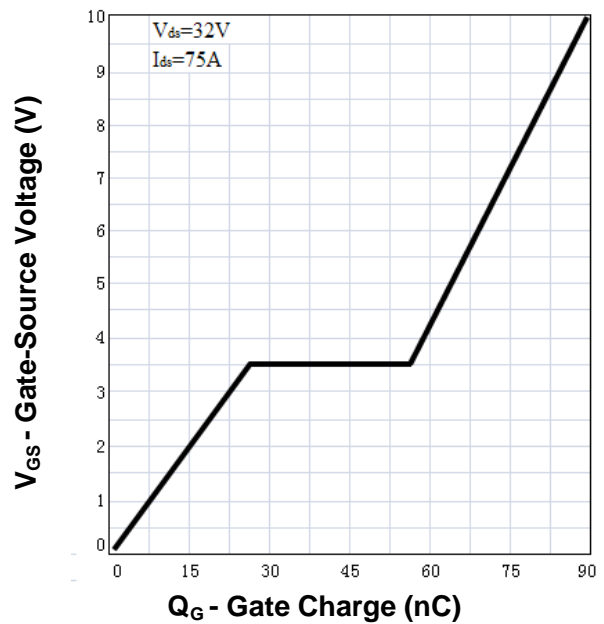
Source-Drain Diode Forward



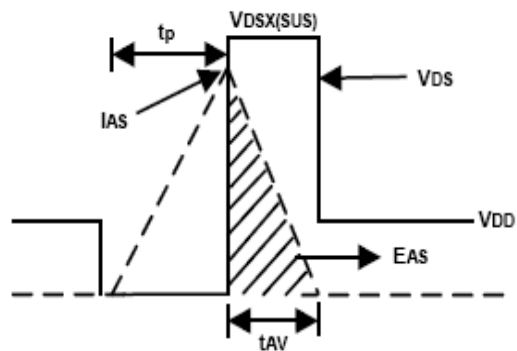
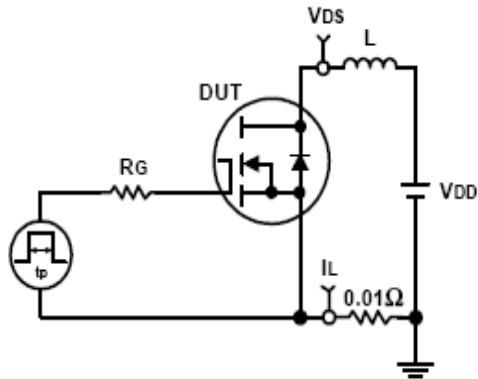
Capacitance



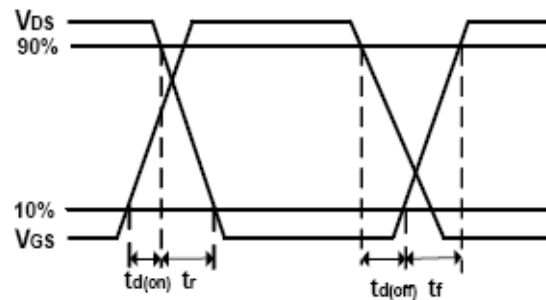
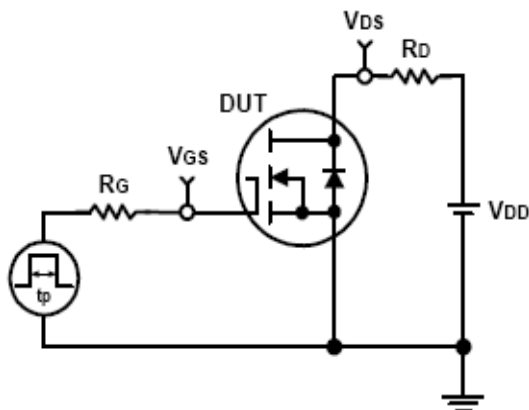
Gate Charge



Avalanche Test Circuit and Waveforms



Switching Time Test Circuit and Waveforms

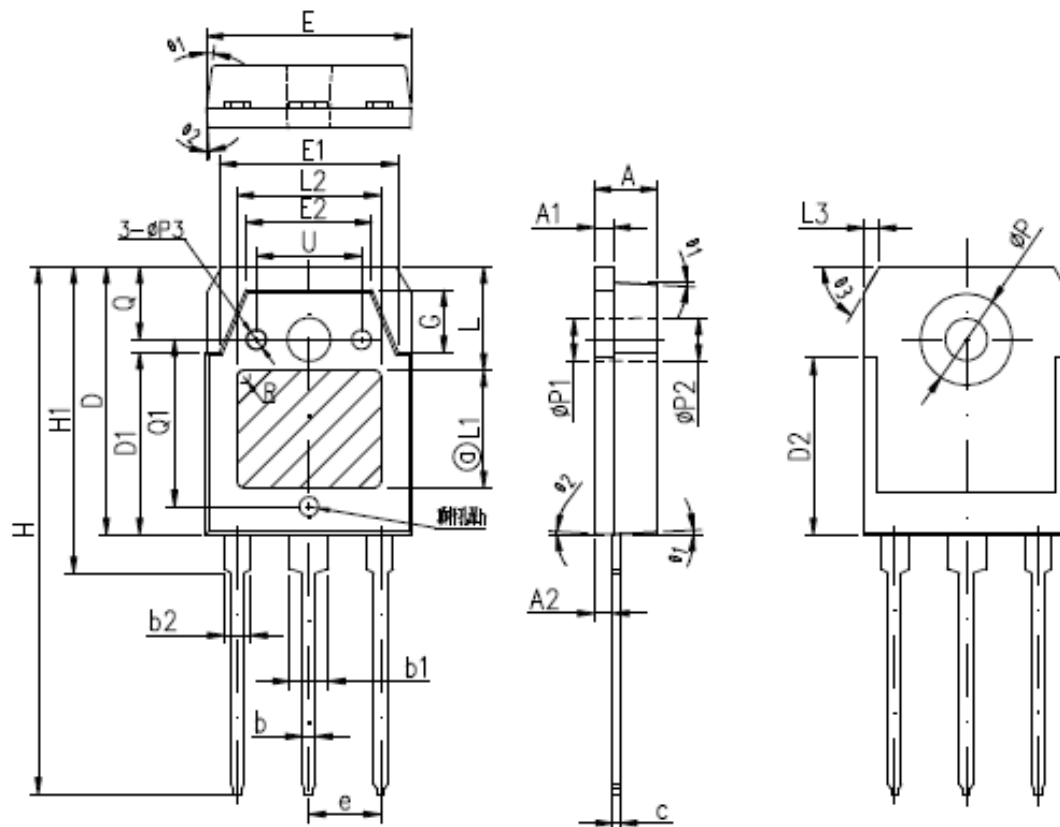


Ordering and Marking Information

Device	Marking	Package	Packaging	Quantity	Reel Size	Tape width
RU40231Q2	RU40231Q2	TO-3P	Tube	30	-	-

Package Information

TO3P Package Outline



SYMBOL	MM			INCH			SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX		MIN	NOM	MAX	MIN	NOM	MAX
A	4.60	4.80	5.00	0.181	0.189	0.197	h	0.05	0.10	0.15	0.002	0.004	0.006
A1	1.40	1.50	1.60	0.055	0.059	0.063	L	7.40 TYP			0.291 TYP		
A2	1.33	1.38	1.43	0.052	0.054	0.056	L1	9.00 TYP			0.354 TYP		
b	0.80	1.00	1.20	0.031	0.039	0.047	L2	11.00 TYP			0.433 TYP		
b1	2.80	3.00	3.20	0.110	0.118	0.126	L3	1.00 REF			0.039 REF		
b2	1.80	2.00	2.20	0.071	0.079	0.087	Øp	6.90	7.00	7.10	0.272	0.276	0.280
c	0.50	0.60	0.70	0.020	0.024	0.028	Øp1	3.20 REF			0.126 REF		
D	19.75	19.90	20.05	0.778	0.783	0.789	Øp2	3.50 REF			0.138 REF		
D1	13.70	13.90	14.10	0.539	0.547	0.555	Øp3	1.40	1.50	1.60	0.055	0.059	0.063
D2	12.90 REF			0.508 REF			R	0.50 REF			0.020 REF		
E	15.40	15.60	15.80	0.606	0.614	0.622	Q	5.00 REF			0.197 REF		
E1	13.40	13.60	13.80	0.528	0.535	0.543	Q1	12.56	12.76	12.96	0.494	0.502	0.510
E2	9.40	9.60	9.80	0.370	0.378	0.386	U	7.80	8.00	8.20	0.307	0.315	0.323
e	5.45 TYP			0.215 TYP			1	5°	7°	9°	5°	7°	9°
G	4.60	4.80	5.00	0.181	0.189	0.197	2	1°	3°	5°	1°	3°	5°
H	40.30	40.50	40.70	1.587	1.594	1.602	3	60° REF			60° REF		
H1	23.20	23.40	23.60	0.913	0.921	0.929							

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