

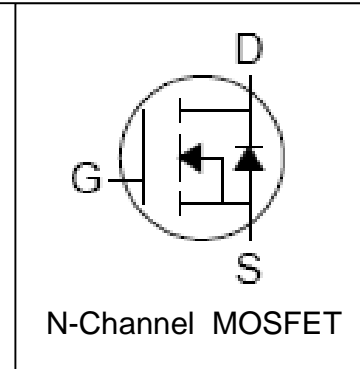
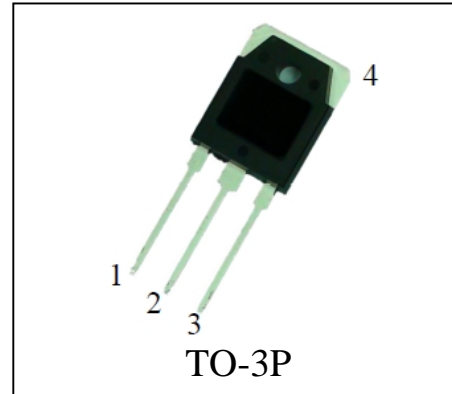
Features

- 40V/190A,
 $R_{DS(ON)}=2.5m$ (Typ.)@ $V_{GS}=10V$
- 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

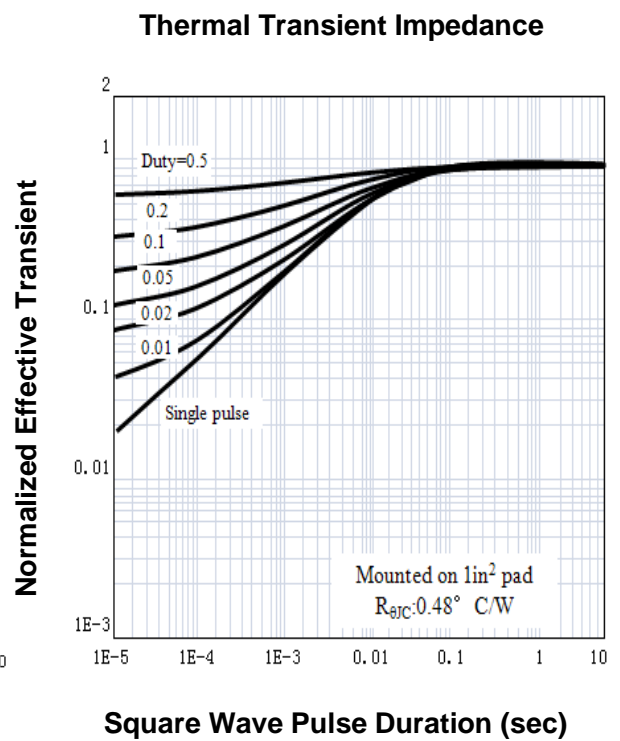
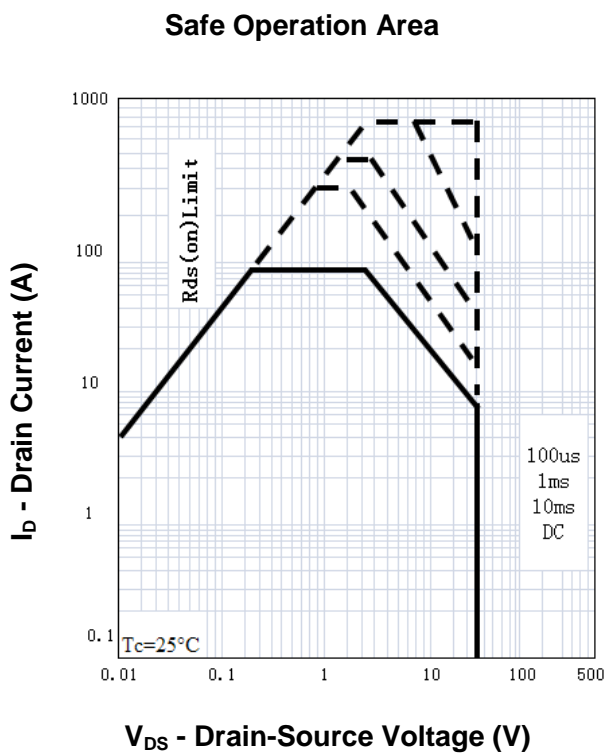
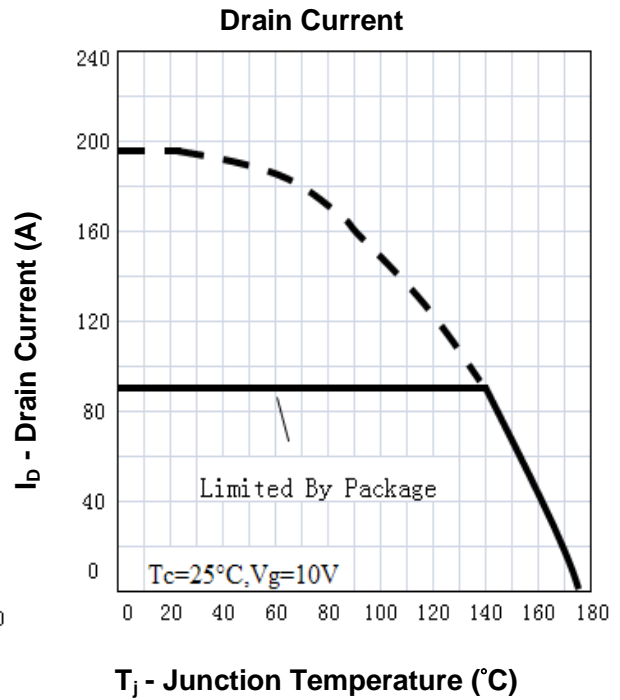
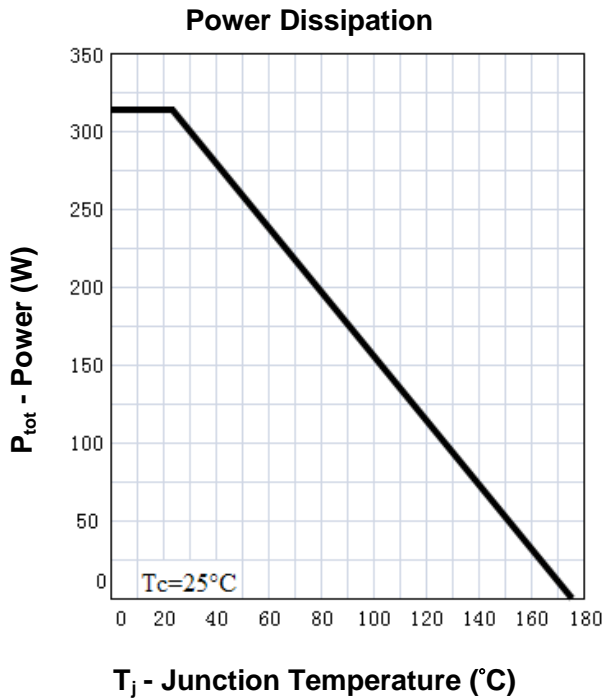
Symbol	Parameter	Rating	Unit
Common Ratings ($T_C=25^{\circ}C$ Unless Otherwise Noted)			
V_{DSS}	Drain-Source Voltage	40	V
V_{GSS}	Gate-Source Voltage	± 20	
T_J	Maximum Junction Temperature	175	$^{\circ}C$
T_{STG}	Storage Temperature Range	-55 to 175	$^{\circ}C$
I_S	Diode Continuous Forward Current	$T_C=25^{\circ}C$ 190 ^①	A
Mounted on Large Heat Sink			
I_{DP}	300 μs Pulse Drain Current Tested	$T_C=25^{\circ}C$ 760 ^②	A
I_D	Continuous Drain Current($V_{GS}=10V$)	$T_C=25^{\circ}C$ 190 ^①	A
		$T_C=100^{\circ}C$ 146 ^①	
P_D	Maximum Power Dissipation	$T_C=25^{\circ}C$ 312	W
		$T_C=100^{\circ}C$ 156	W
$R_{\theta JC}$	Thermal Resistance-Junction to Case	0.48	$^{\circ}C/W$
Drain-Source Avalanche Ratings			
E_{AS} ^③	Avalanche Energy, Single Pulsed	812	mJ

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

Symbol	Parameter	Test Condition	RU40190Q2			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	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	2	3	4	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$			± 100	nA
$R_{DS(ON)}^{(4)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=75A$		2.5	3.5	m Ω
Diode Characteristics						
$V_{SD}^{(4)}$	Diode Forward Voltage	$I_{SD}=75A, V_{GS}=0V$			1.2	V
t_{rr}	Reverse Recovery Time	$I_{SD}=75A, di_{SD}/dt=100A/\mu s$		40		ns
Q_{rr}	Reverse Recovery Charge			52		nC
Dynamic Characteristics ⁽⁵⁾						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$		1.2		Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=20V,$ Frequency=1.0MHz		4800		pF
C_{oss}	Output Capacitance			950		
C_{riss}	Reverse Transfer Capacitance			480		
$t_{d(ON)}$	Turn-on Delay Time			19		
t_r	Turn-on Rise Time	$V_{DD}=20V, R_L=0.3\Omega,$ $I_{DS}=75A, V_{GEN}=10V,$ $R_G=2.5\Omega$		96		
$t_{d(OFF)}$	Turn-off Delay Time			70		
t_f	Turn-off Fall Time			50		
Gate Charge Characteristics ⁽⁵⁾						
Q_g	Total Gate Charge	$V_{DS}=32V, V_{GS}=10V,$ $I_{DS}=75A$		120		nC
Q_{gs}	Gate-Source Charge			34		
Q_{gd}	Gate-Drain Charge			46		

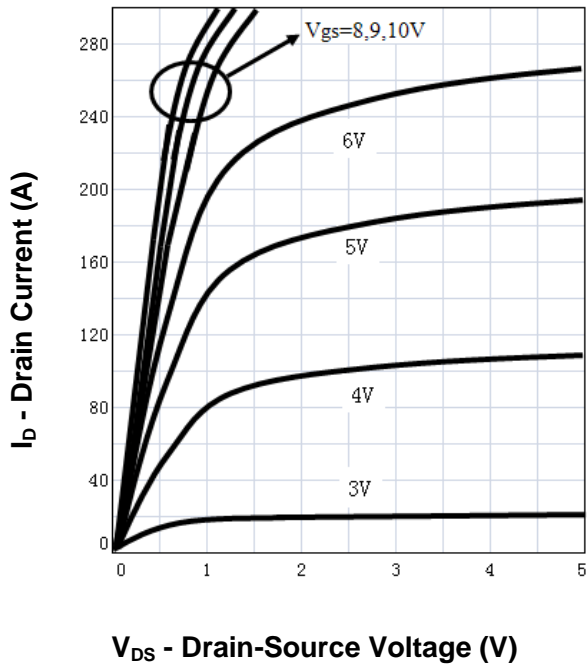
- Notes: ① Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 90A.
 ② Pulse width limited by safe operating area.
 ③ Limited by $T_{Jmax}, I_{AS}=57A, V_{DD}=32V, R_G=50\Omega$, Starting $T_J=25^\circ\text{C}$.
 ④ Pulse test; Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
 ⑤ Guaranteed by design, not subject to production testing.

Typical Characteristics

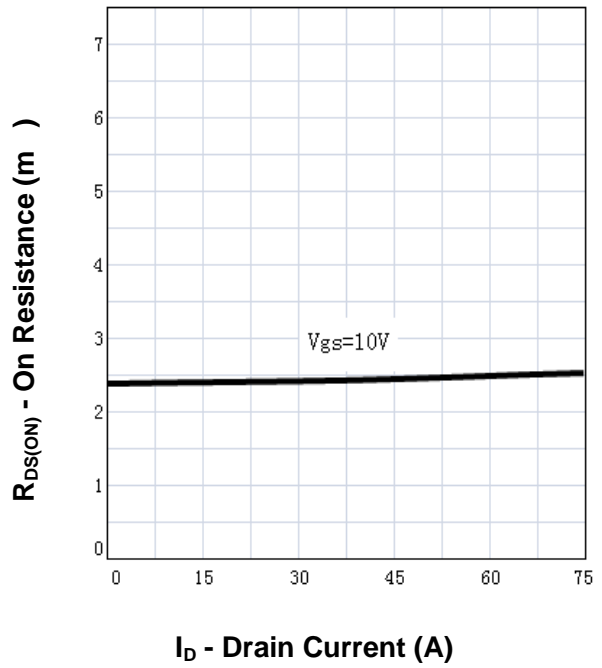


Typical Characteristics

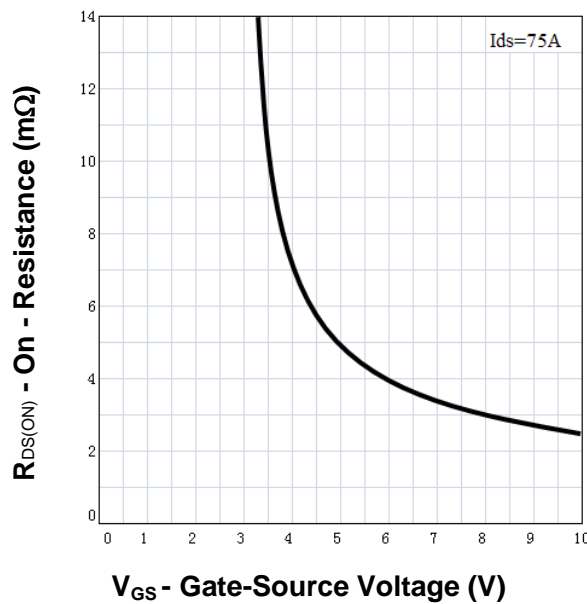
Output Characteristics



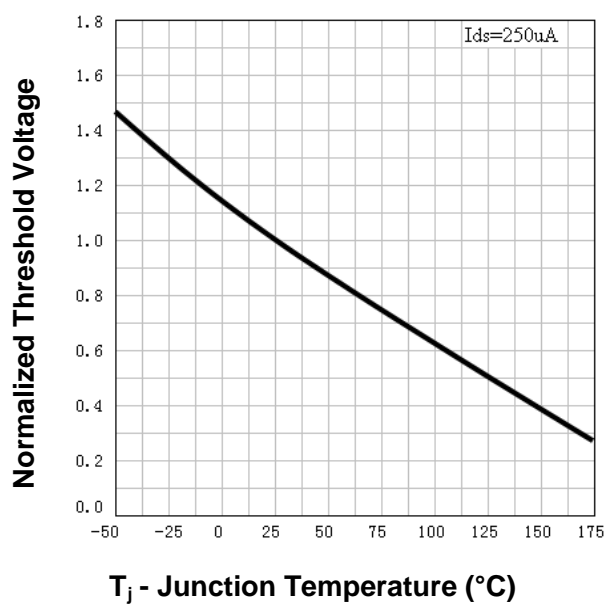
Drain-Source On Resistance



Drain-Source On Resistance

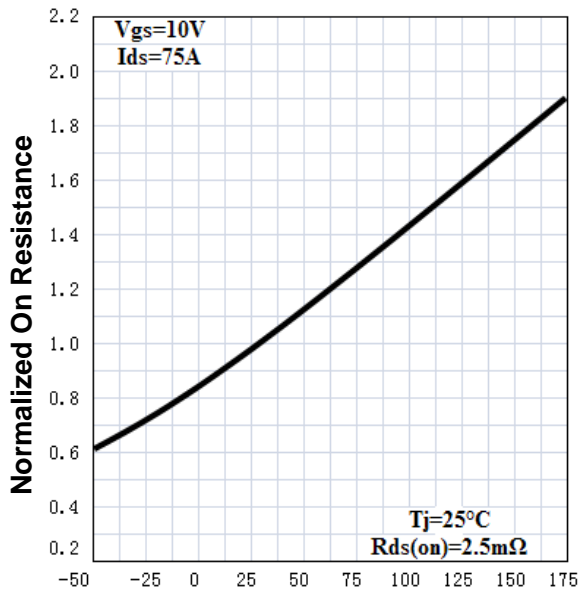


Gate Threshold Voltage



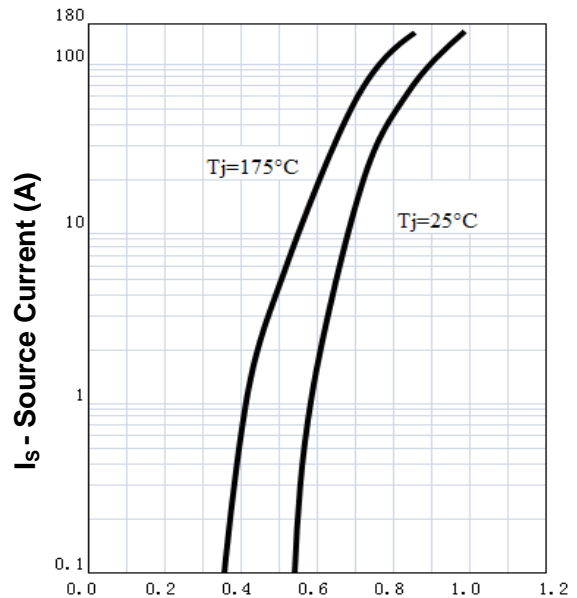
Typical Characteristics

Drain-Source On Resistance



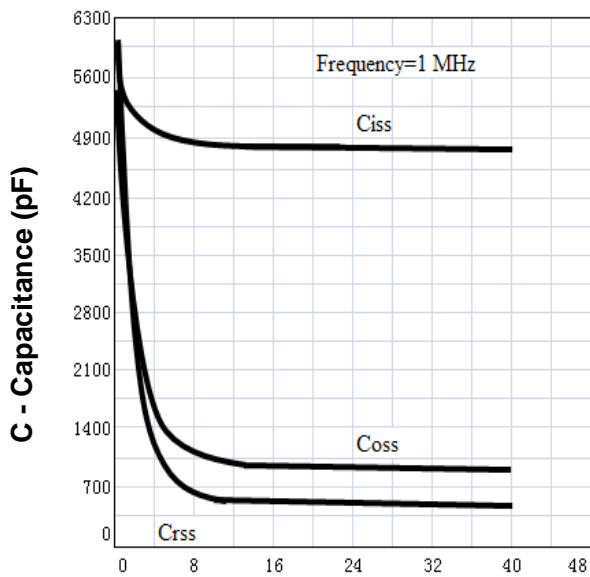
T_j - Junction Temperature (°C)

Source-Drain Diode Forward



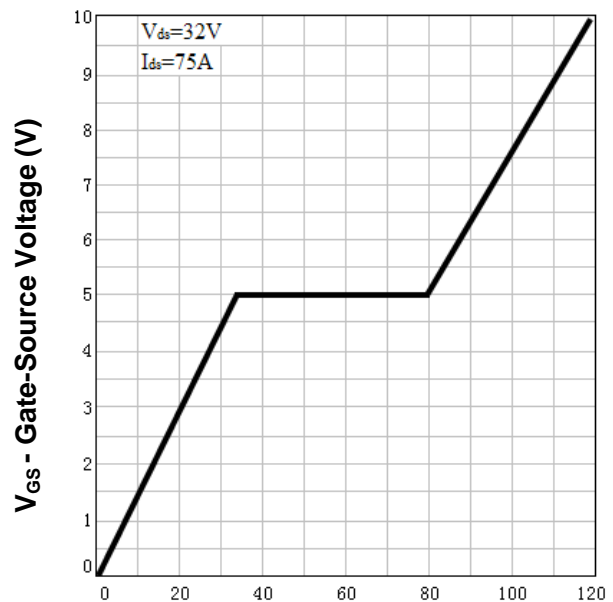
V_{SD} - Source-Drain Voltage (V)

Capacitance



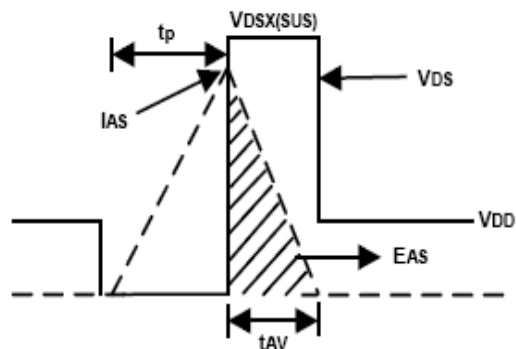
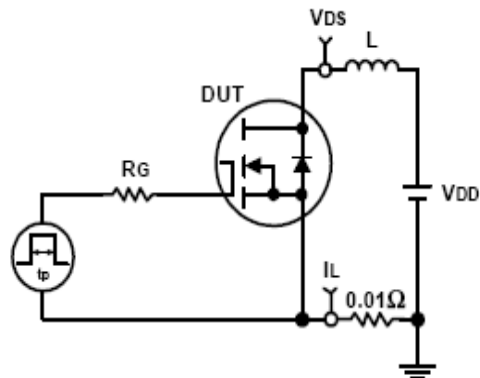
V_{DS} - Drain-Source Voltage (V)

Gate Charge

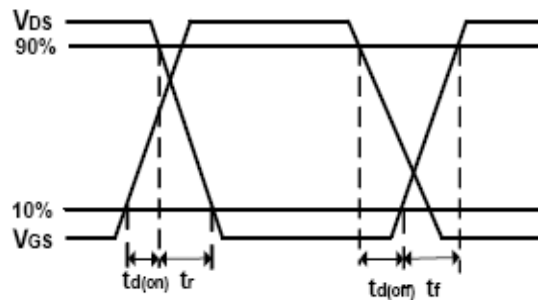
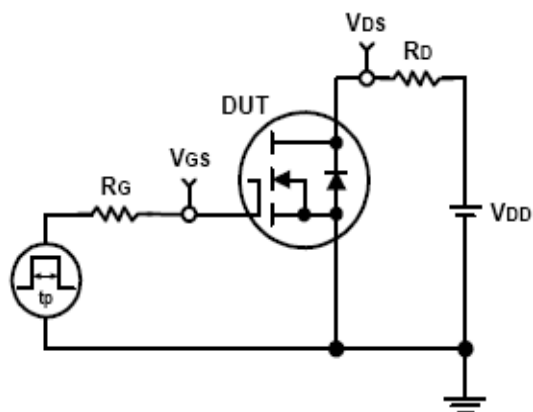


Q_G - Gate Charge (nC)

Avalanche Test Circuit and Waveforms



Switching Time Test Circuit and Waveforms

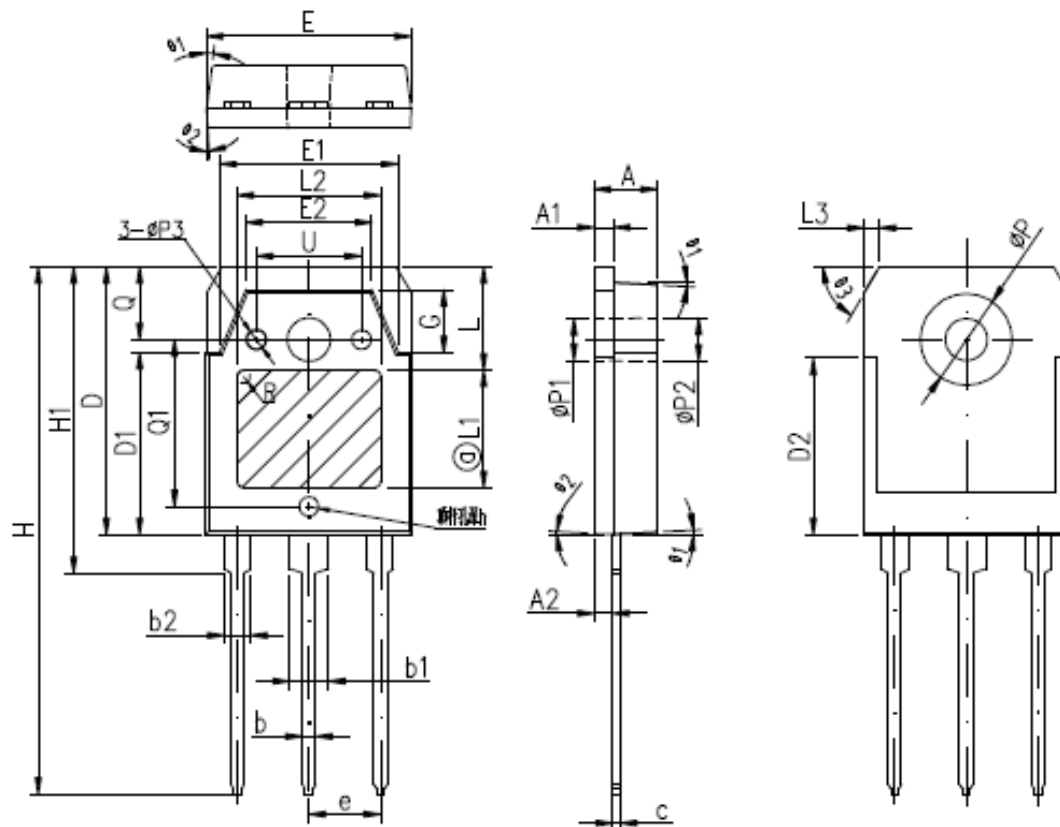


Ordering and Marking Information

Device	Marking	Package	Packaging	Quantity	Reel Size	Tape width
RU40190Q2	RU40190Q2	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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