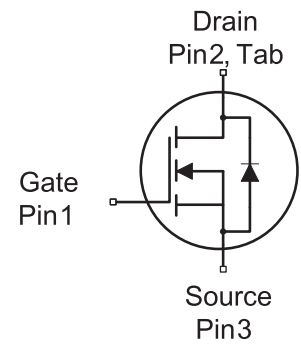


N-Channel Trench Power MOSFET

Features

- 30V, 90A, $R_{DS(ON)}=3.5m\Omega@V_{GS}=10V$
- Reliable and Rugged
- Advanced trench process technology High Density Cell
Design For Ultra Low On-Resistance

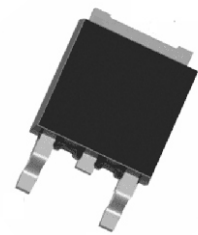


Application

- Battery protection
- Power management

Product Summary

V_{DS}	30V
$R_{DS(on)}@V_{GS}=10V$	3.5m Ω
I_D	90A



TO-252

Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	30	V
Continuous drain current $T_C = 25^\circ\text{C}$ (Silicon limit) $T_C = 25^\circ\text{C}$ (Package limit) $T_C = 100^\circ\text{C}$ (Silicon limit)	I_D	- 90 120	A
Pulsed drain current $T_C = 25^\circ\text{C}$, t_p limited by T_{jmax}	$I_{D\ pulse}$	320	
Avalanche energy, single pulse (L=0.5mH,Rg=25 Ω)	E_{AS}	300	mJ
Gate-emitter voltage	V_{GS}	± 25	V
Power dissipation $T_C = 25^\circ\text{C}$	P_{tot}	115	W
Operating junction and storage temperature	T_j, T_{stg}	-55~175	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case. Max	R_{thJC}	0.8	°C/W
Thermal resistance, junction – ambient. Max	R_{thJA}	50	

Electrical Characteristic, at $T_j = 25\text{ }^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	

Static Characteristic

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$ $T_j=25^\circ C$ $T_j=125^\circ C$	1	1.5	3	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$ $T_j=25^\circ C$ $T_j=125^\circ C$	-	-	1 50	μA
Gate-source leakage current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-100	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$T_j=25^\circ C, I_D=30A,$ $V_{GS}=10V$ $V_{GS}=4.5V$	-	3.5	4.5 7.9	$m\Omega$
Transconductance	g_{fs}	$V_{DS}=5V, I_D=24A$	20	-	-	S

Dynamic Characteristic

Input Capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=25V,$ $f=1MHz$	-	2203	-	pF
Output Capacitance	C_{oss}		-	362	-	
Reverse Transfer Capacitance	C_{rss}		-	277	-	
Gate Total Charge	Q_G	$V_{GS}=10V, V_{DS}=30V,$ $I_D=40A, f=1MHz$	-	84	-	nC
Gate-Source charge	Q_{gs}		-	14	-	
Gate-Drain charge	Q_{gd}		-	30	-	
Turn-on delay time	$t_{d(on)}$	$T_j=25^\circ C, V_{DD}=30V,$ $I_{DS}=40A, R_L=3\Omega$	-	20	-	ns
Rise time	t_r		-	15	-	
Turn-off delay time	$t_{d(off)}$		-	50	-	
Fall time	t_f		-	8	-	
Gate resistance	R_G	$V_{GS}=0V, V_{DS}=0V,$ $f=1MHz$	-	1.8	-	Ω

Body Diode Characteristic

Body Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_{SD}=40A$	-	0.86	1	V
Body Diode Reverse Recovery Time	t_{rr}	$I_{SD}=40A,$ $dI/dt=100A/\mu s$	-	33	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	61	-	nC

Typical Performance Characteristics

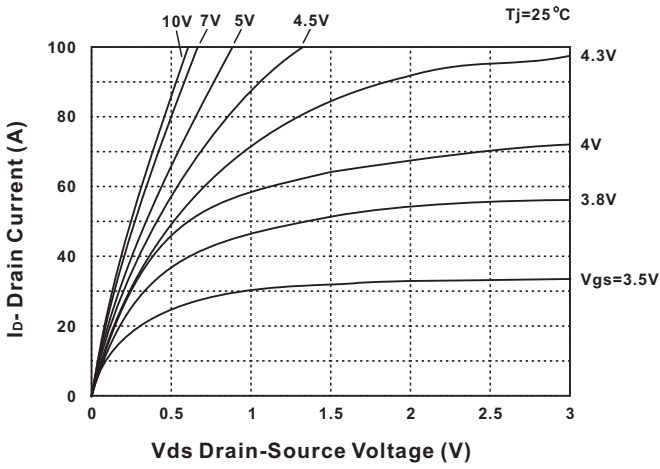


Figure 1 Output Characteristics

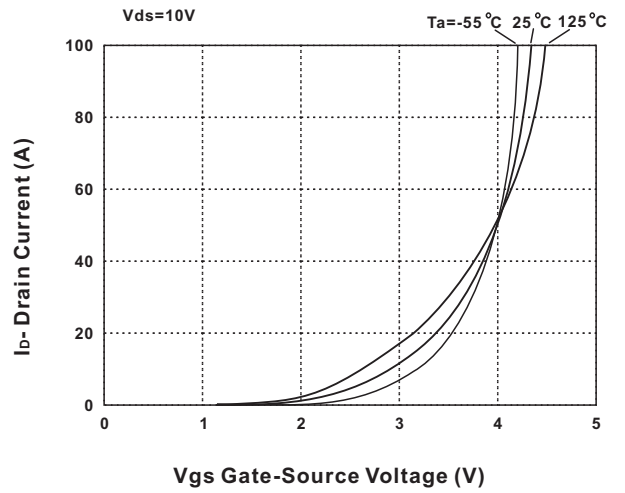


Figure 2 Transfer Characteristics

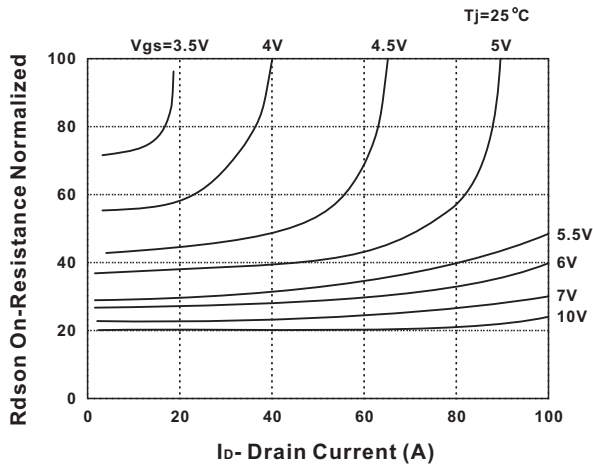


Figure 3 Rdson-Drain Current

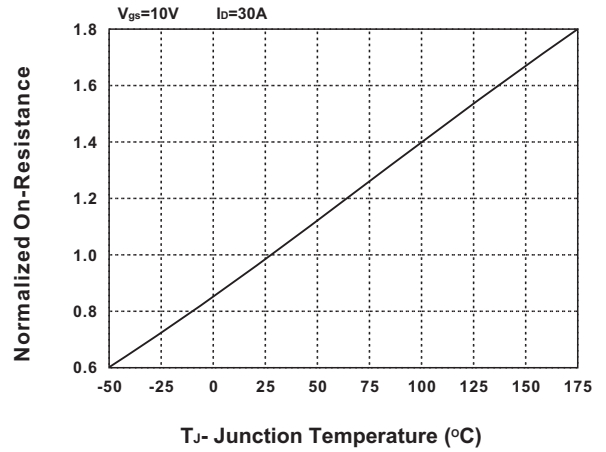


Figure 4 Rdson-Junction Temperature

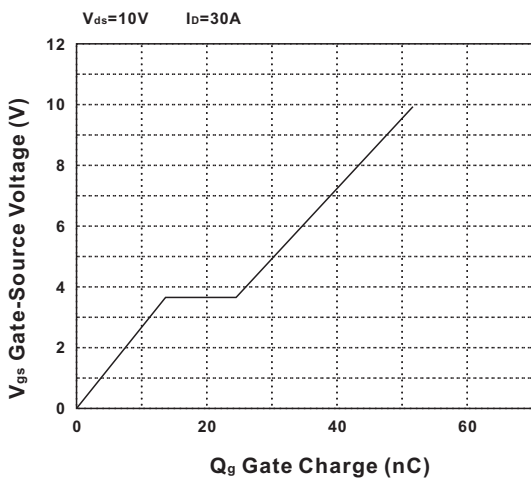


Figure 5 Gate Charge

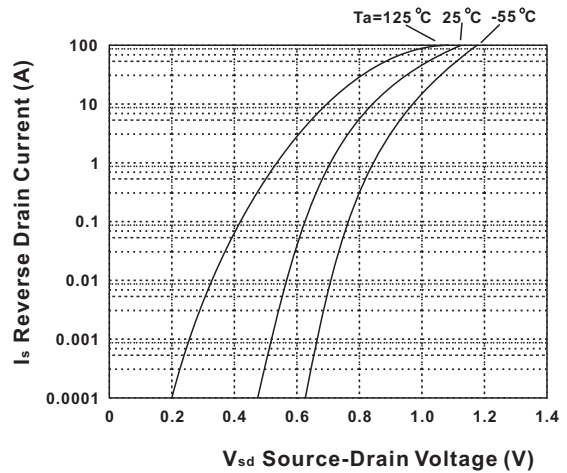
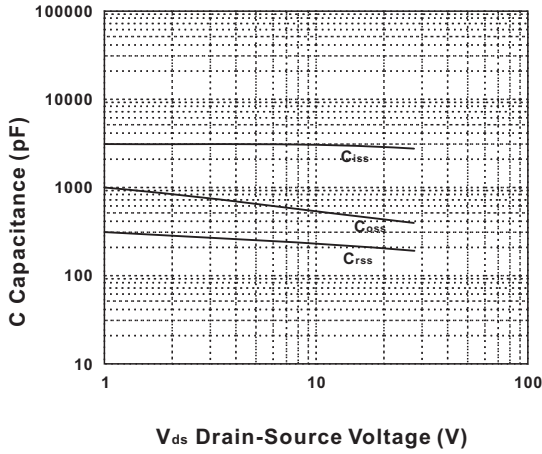
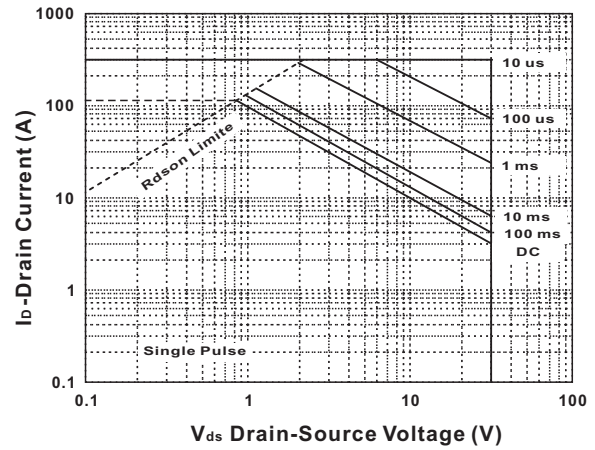


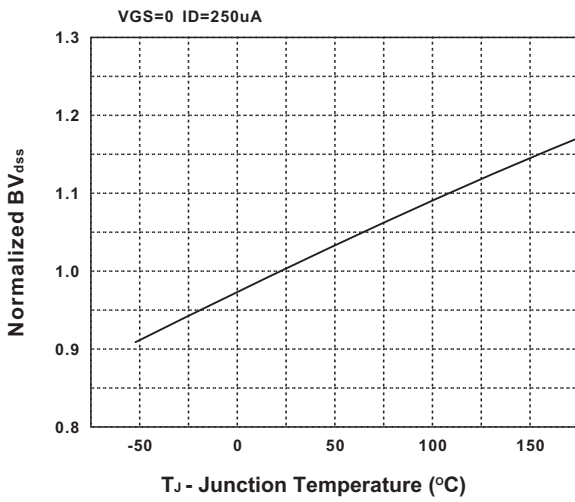
Figure 6 Source-Drain Diode Forward



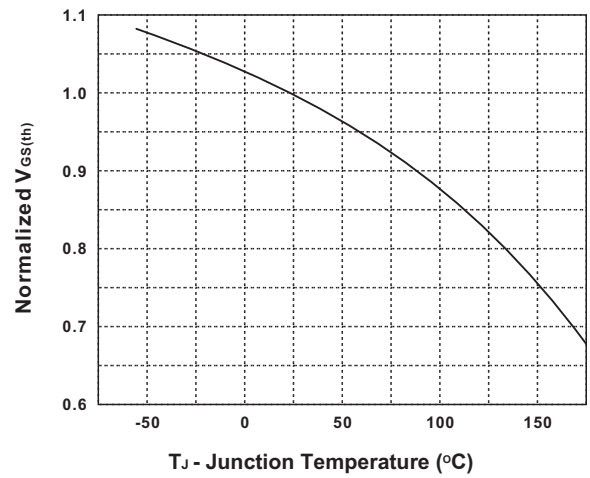
V_{ds} Drain-Source Voltage (V)
Figure 7 Capacitance vs V_{ds}



V_{ds} Drain-Source Voltage (V)
Figure 8 Safe Operation Area



T_J - Junction Temperature (°C)
Figure 9 BV_{bss} vs Junction Temperature



T_J - Junction Temperature (°C)
Figure 10 V_{GS(th)} vs Junction Temperature

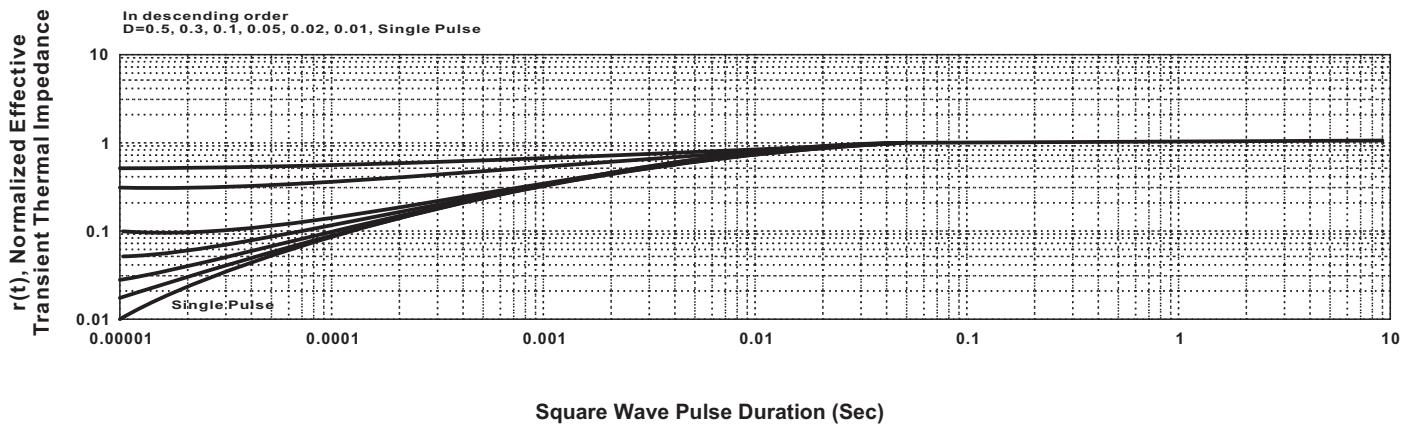
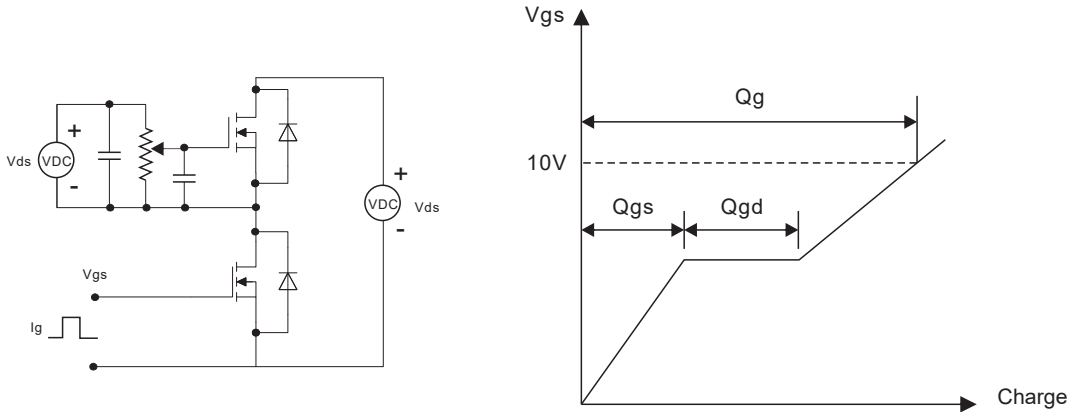


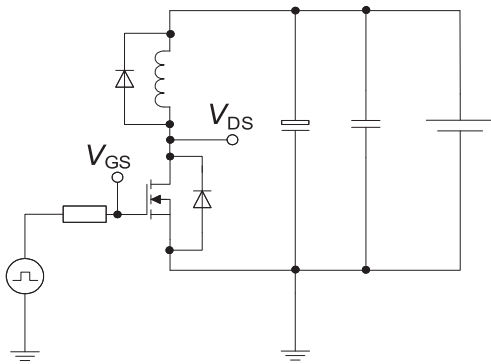
Figure 11 Normalized Maximum Transient Thermal Impedance

Test Circuit & Waveform

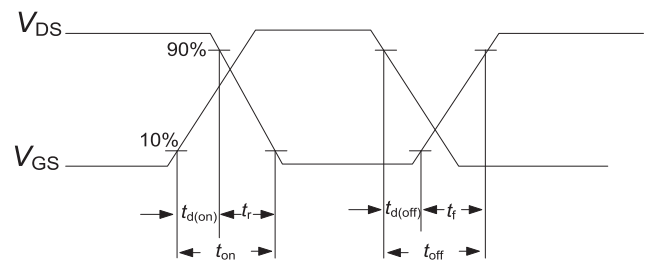
Gate Charge Test Circuit & Waveform



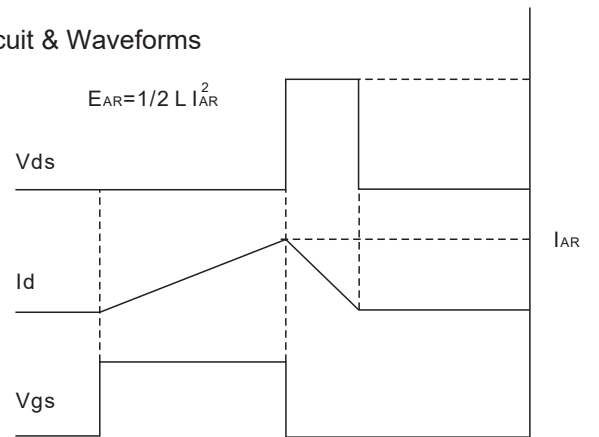
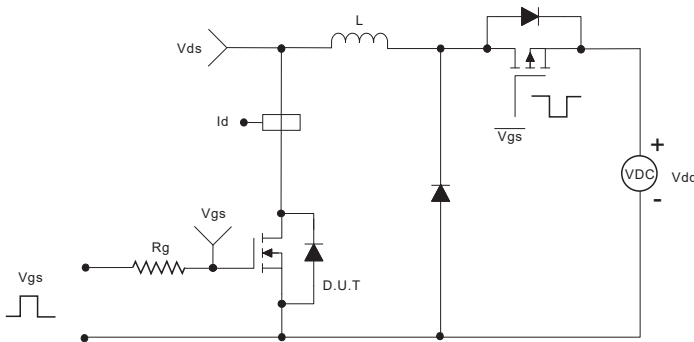
Switching Times Test Circuit for Inductive Load



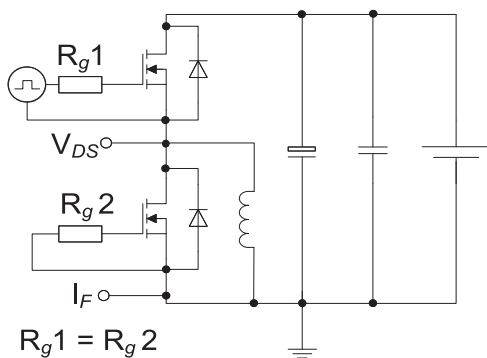
Switching Times Waveform



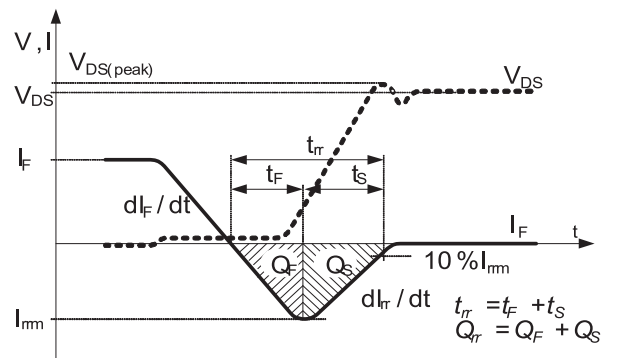
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



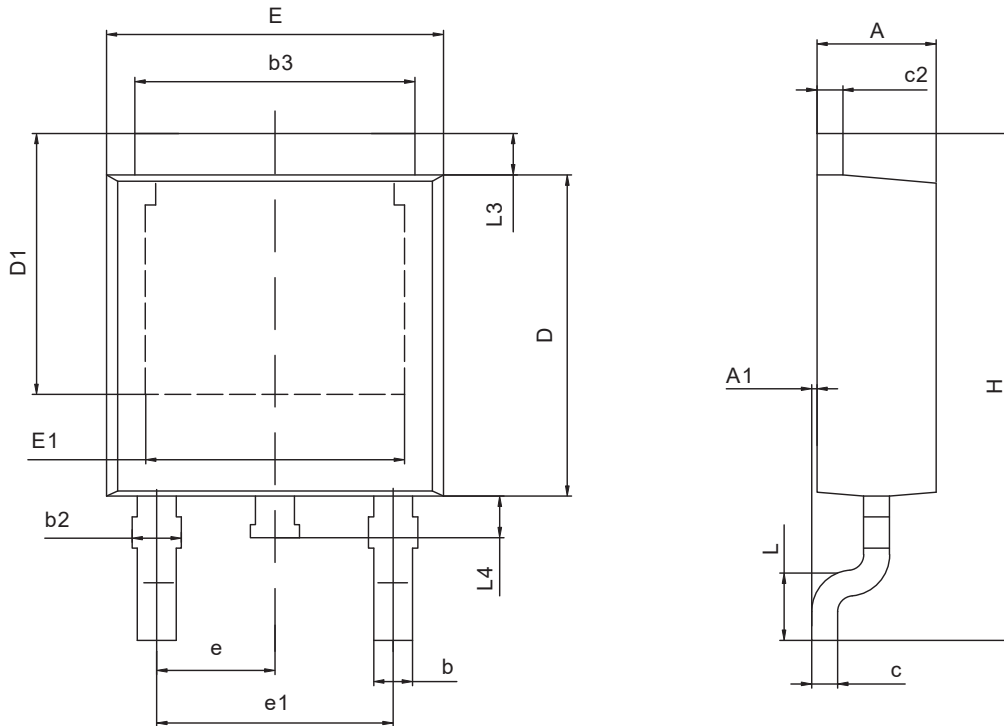
Test Circuit for Diode Characteristics



Diode Recovery Waveform



Package Outlines



Dimension	Millimeters	
	Min.	Max.
A	2.16	2.41
A1	0.00	0.15
b	0.64	0.89
b2	0.65	1.15
b3	4.95	5.50
c	0.46	0.61
c2	0.40	0.98
D	5.97	6.22
D1	5.02	5.84
E	6.35	6.73
E1	4.32	5.50
e	2.29 (BSC)	
e1	4.57	
H	9.40	10.48
L	1.18	1.78
L3	0.89	1.27
L4	0.51	1.02

Package Marking and Ordering Information

Type	Package	Marking	Reek Size	Tape Width	Qty
RDB4P5N03U	TO-252	-	-	-	-

Revision history

Date	Revision	Changes
28-May-2020	1.0	Initial release

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