

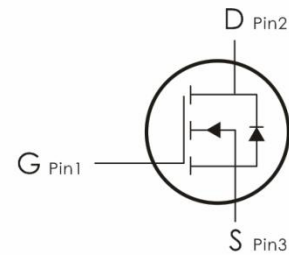
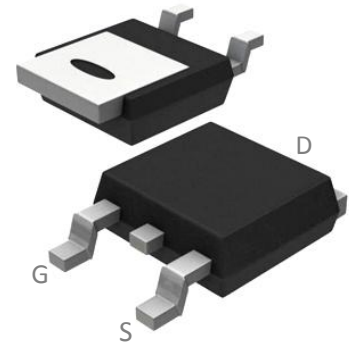
## Description:

This N-Channel MOSFET uses advanced trench technology and design to provide excellent  $R_{DS(on)}$  with low gate charge.

It can be used in a wide variety of applications.

## Features:

- 1)  $V_{DS}=60V, I_D=15A, R_{DS(ON)}<40m\ \Omega @V_{GS}=10V$  (Typ:  $30m\ \Omega$ )
- 2) Low gate charge.
- 3) Green device available.
- 4) Advanced high cell density trench technology for ultra low  $R_{DS(ON)}$ .
- 5) Excellent package for good heat dissipation.
- 6) MSL3



## Package Marking and Ordering Information:

Part NO.	Marking	Package	Packing
DE040NG-B	E040N-B	TO- 252	2500 pcs/Reel

## Absolute Maximum Ratings: ( $T_C=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain-Source Voltage	60	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current <sup>1</sup>	15	A
	Continuous Drain Current- $T_C=100^\circ C$ <sup>1</sup>	10.5	
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	60	
$P_D$	Power Dissipation	21	W
$E_{AS}$	Single pulse avalanche energy <sup>3</sup>	17.6	mJ
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55-+150	$^\circ C$

## Thermal Characteristics:

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	5.7	$^\circ C/W$

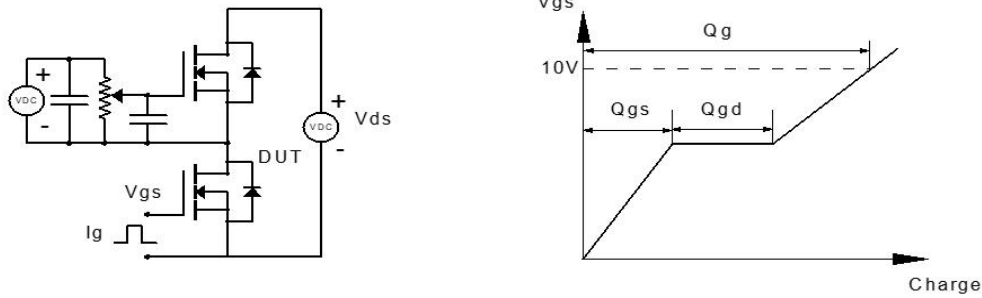
**Electrical Characteristics:** ( $T_C=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu\text{A}$	60	---	---	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=60V$	---	---	1	$\mu\text{A}$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu\text{A}$	1.2	1.67	2.5	V
$R_{DS(on)}$	Drain-Source On Resistance <sup>4</sup>	$V_{GS}=10V, I_D=10A$	---	30	40	$\text{m}\Omega$
		$V_{GS}=4.5V, I_D=5A$	---	36	47	$\text{m}\Omega$
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, f=1\text{MHz}$	---	650	---	pF
$C_{oss}$	Output Capacitance		---	44	--	
$C_{rss}$	Reverse Transfer Capacitance		---	39.9	---	
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=30V, I_D=10A,$ $R_{ENG}=2.7\ \Omega, V_{GS}=10V$	---	10.5	---	ns
$t_r$	Rise Time		---	73.5	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	16	---	ns
$t_f$	Fall Time		---	5	---	ns
$Q_g$	Total Gate Charge		$V_{GS}=10V, V_{DS}=30V,$	---	19	---
$Q_{gs}$	Gate-Source Charge	$I_D=10A$	---	4.2	---	nC
$Q_{gd}$	Gate-Drain "Miller" Charge		---	3.9	---	nC
<b>Drain-Source Diode Characteristics</b>						
$V_{SD}$	Diode Forward Voltage	$V_{GS}=0V, I_{SD}=15A$	---	---	1.2	V
$I_S$	Continuous Drain Current	$V_D=V_G=0V$	---	---	15	A
$I_{SM}$	Pulsed Drain Current		---	---	60	A
$T_{rr}$	Reverse Recovery Time	$I_F=10A, T_J=25^\circ\text{C}$	---	19	---	ns
$Q_{rr}$	Reverse Recovery Charge	$dI/dt=100A/\mu\text{s}$	---	21	---	nC

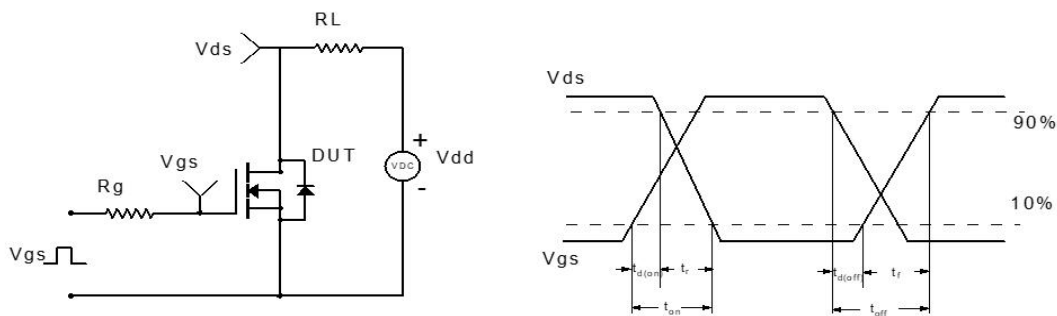
## Notes:

1. Computed continuous current assumes the condition of  $T_{j,Max}$  while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. EAS condition :  $T_J=25^{\circ}C, V_{DD}=30V, V_G=10V, L=0.5mH$
4. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 0.5\%$

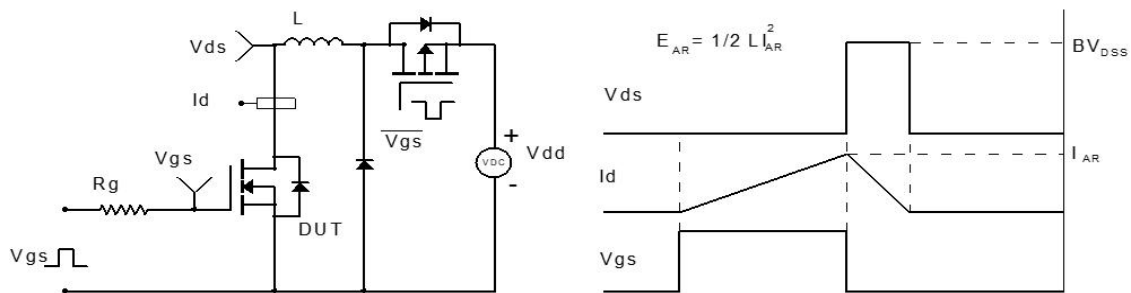
## Test Circuit



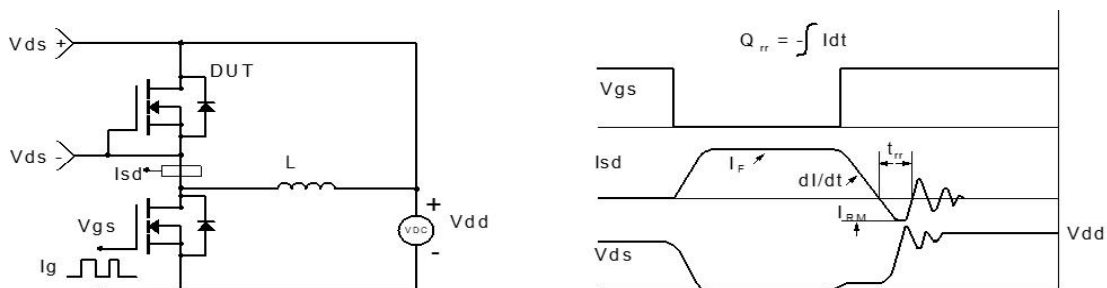
**Figure 1: Gate Charge Test Circuit & Waveform**



**Figure 2: Resistive Switching Test Circuit & Waveform**



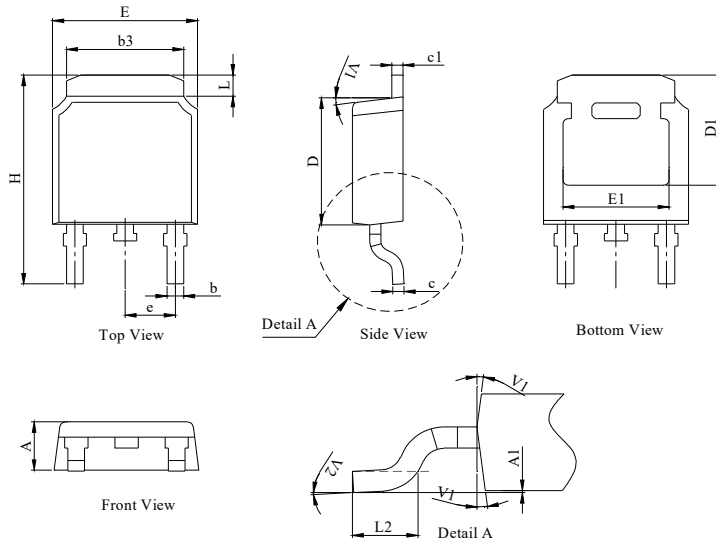
**Figure 3: Unclamped Inductive Switching Test Circuit & Waveform**



## TO-252 Package Information

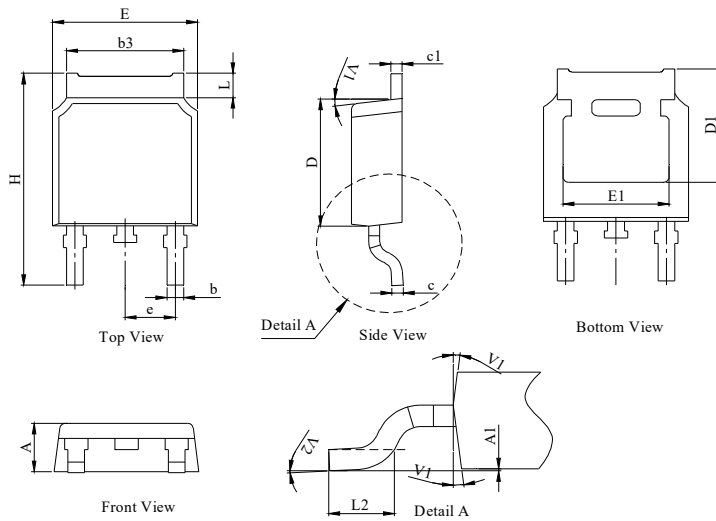
### Package Outline Type-A

UNIT: mm



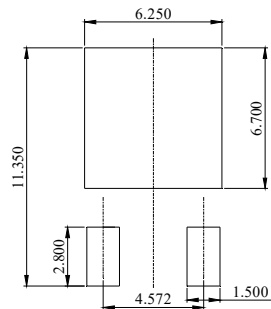
DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	2.18	2.30	2.39
A1	0	--	0.13
b	0.64	0.76	0.89
c	0.40	0.50	0.61
c1	0.46	0.50	0.58
D	5.97	6.10	6.23
D1	5.05	--	--
E	6.35	6.60	6.73
E1	4.32	--	--
b3	5.21	5.38	5.55
e	2.29 BSC		
H	9.40	10.00	10.40
L	0.89	--	1.27
L2	1.40	--	1.78
V1	7° REF		
V2	0°	--	6°

### Package Outline Type-B



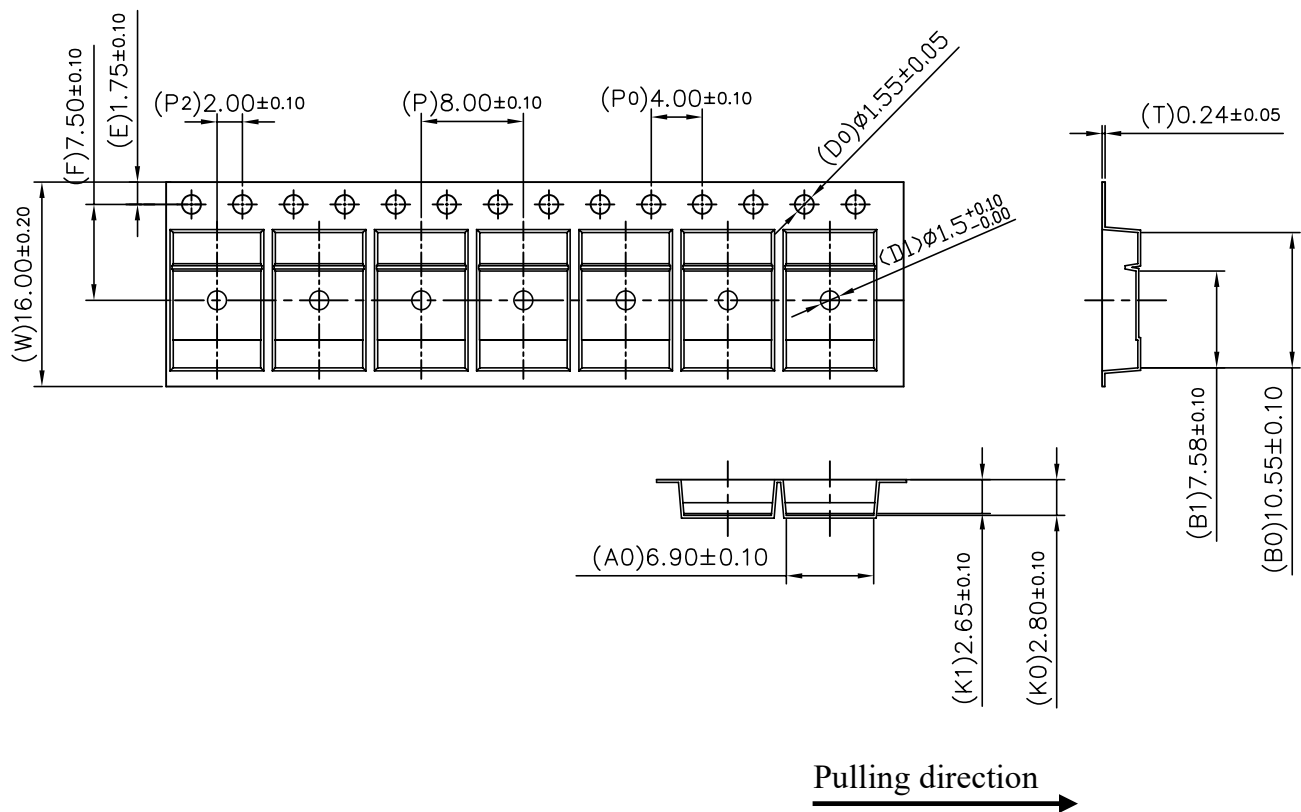
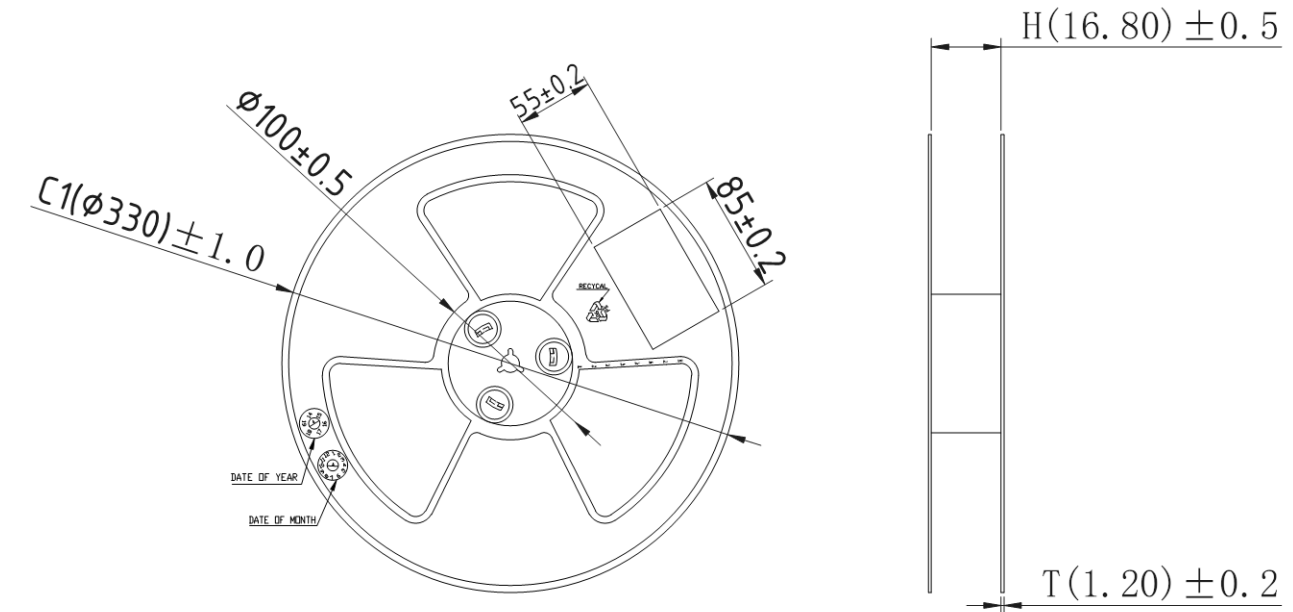
DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	2.10	2.30	2.40
A1	0	--	0.13
b	0.66	0.76	0.86
b3	5.21	5.38	5.55
c	0.40	0.50	0.60
c1	0.44	0.50	0.58
D	5.90	6.10	6.30
D1	5.30REF		
E	6.40	6.60	6.80
E1	4.63	-	-
e	2.29 BSC		
H	9.50	10.00	10.70
L	1.09	--	1.21
L2	1.35	--	1.65
V1	7° REF		
V2	0°	--	6°

### Recommended Soldering Footprint



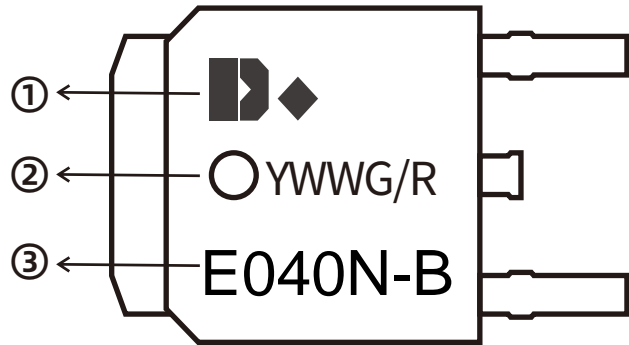
## Tape & Reel Information

Dimensions in mm



## Marking Information:

- ①. Doingter LOGO
- ②. Date Code(YWWG / R)  
 Y : Year Code , last digit of the year  
 WW : Week Code(01-53)  
 G/R : G(Green) /R(Lead Free)
- ③. Part NO.



## Previous Version

Version	Date	Subjects (major changes since last revision)
1.0	2025-06-29	Release of final version

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