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230 -3410 LOUGHEED HWY
VANCOUVER, BC, V5M 2A4 CANADA

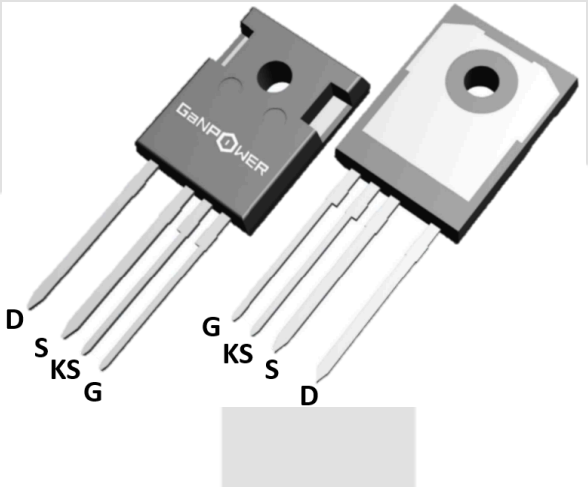
GP120R75T4

N-channel 1200V 20A GaN Power HEMT in TO247-4 Package

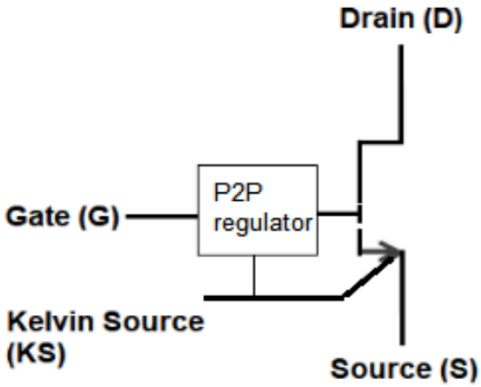
Preliminary Datasheet version: 1.2

Features

BV_{dss}	R_{dson}	I_{ds}	V_{GS}	$V_{GS(TH)}$
1200V	75mΩ	20A	-20 V to 20V	2.7 V



- Ultra-low R_{DSON}
- High dv/dt capability
- Extremely low input capacitance
- Zero Qrr
- Outstanding switching performance
- Low Profile
- **Upgraded P2P GaN with input regulator IC to match input lead and voltage of existing SiC MOSFET**



Applications

- Switching Power Applications
- Server and Telecom Power Application
- EV OBC and DC-DC Converters UPS, Inverters, PV

Description

These devices are N-channel 1200V Power GaN HEMTs based on proprietary E-mode GaN on silicon technology, integrating an input regulator circuit to match input lead and voltage of existing SiC MOSFET in a pin-to-pin (P2P) fashion. The resulting product has extremely low on-state resistance, very low input capacitance and zero reverse recovery charge, making it especially suitable for applications which require superior power density, ultra-high switching frequency and outstanding efficiency.

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Device Characteristics

Basic Parameters				Test data			
	Parameters		Conditions	Min	Typical	Max	Unit
1	$V_{GS(TH)}$	Zero gate voltage drain current, T_c = 25℃	$V_{DS} = V_{GS}$ I_D = 3mA	2.5	2.7	2.9	V
2	V_G	Gate voltage range		-20	12	20	V
3	BV_{DSS}	Drain-Source breakdown voltage	V_{GS} = 0V I_D < 20μA		1200		V
4	I_{DSS}	Zero gate voltage drain current, T_C = 25℃	V_{GS} = 0V V_{DS} = 1200V	1.0	2.5	4.0	μA
5	I_{GSS}	Gate-Source Leakage @ 25℃	V_{GS} = 12V V_{DS} = 0V	30	50	80	mA
6	R_{DSON}	Static drain-source on resistance, T_C = 25℃	V_{GS} = 12V	70	75	85	mΩ

Switching Performance				Test data			
	Parameters		Conditions	Min	Typical	Max	Unit
1	$t_{D(ON)}$	Turn-on delay time	V_{DS} = 800V I_D = 9A V_{GS} = +12V/-1V R_{GON} = 2Ω R_{GOFF} = 0Ω		21		ns
2	t_R	Rise time			38		ns
3	$t_{D(OFF)}$	Turn-off delay time			11		ns
4	t_F	Fall time			24		ns

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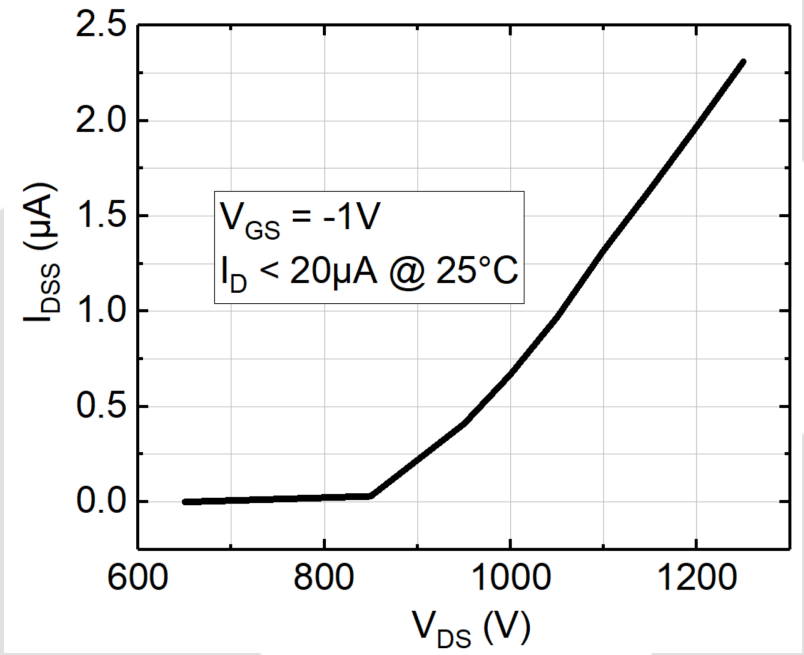
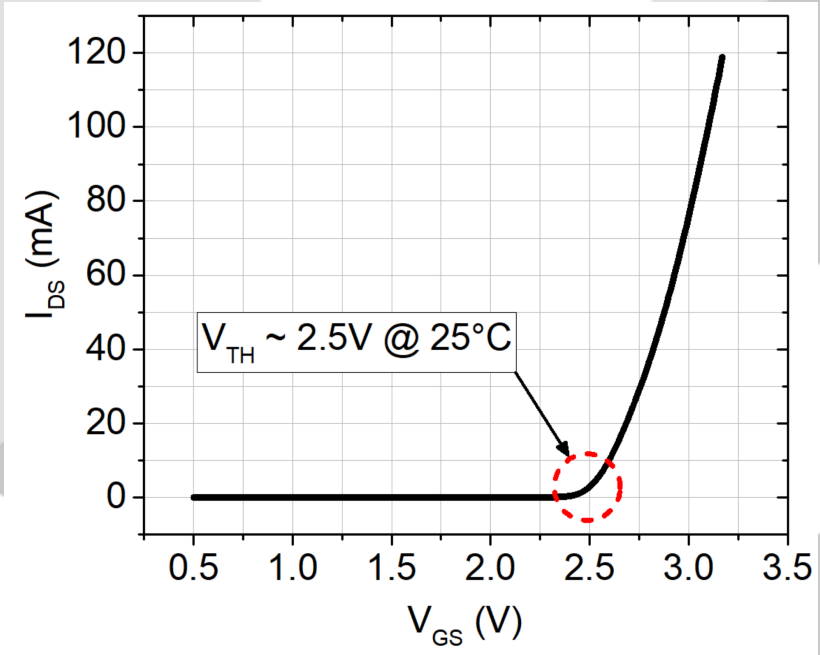
Electrical Performance





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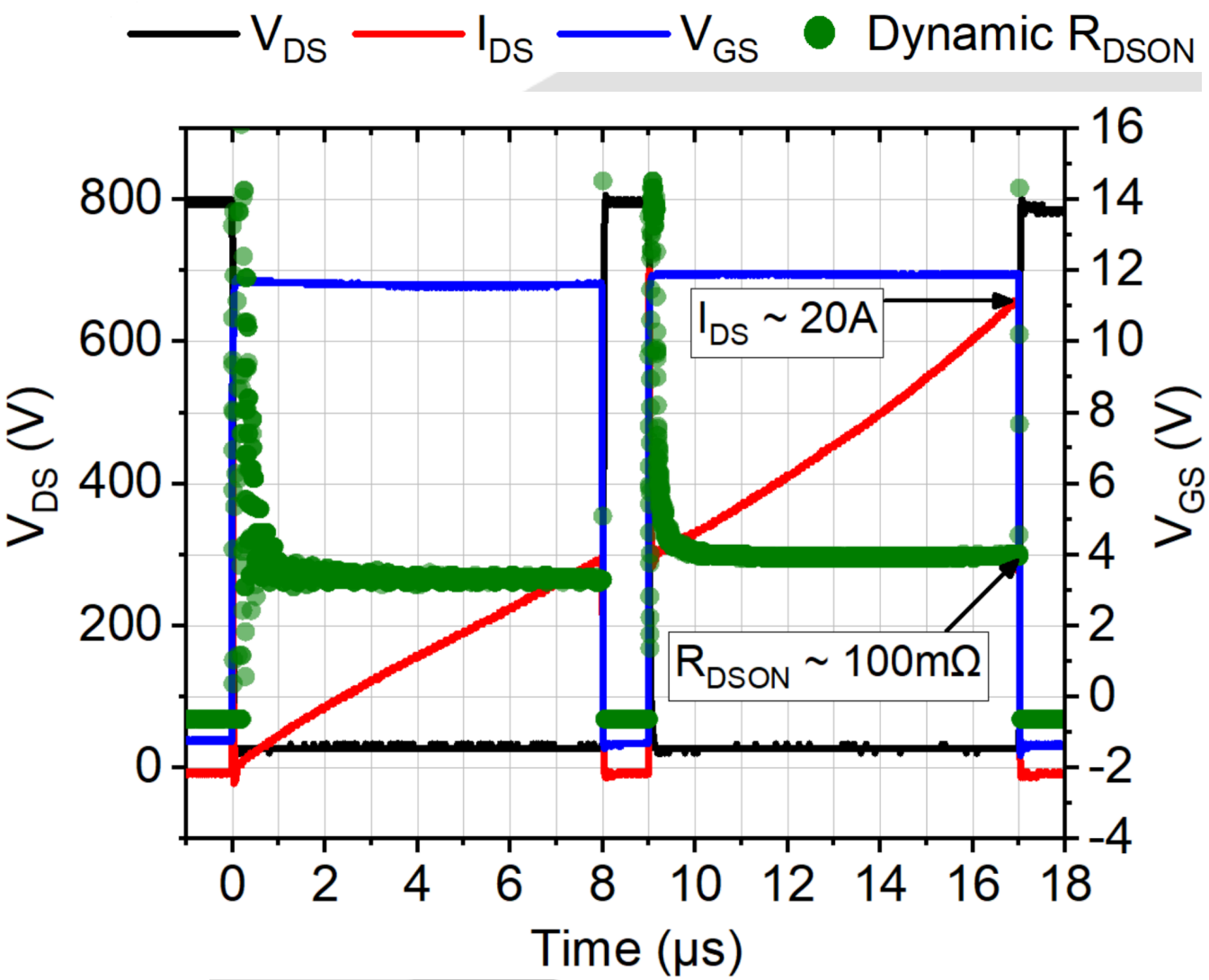

DPT @ 25°C: V_{BUS} = 800V, L-load = 360μH

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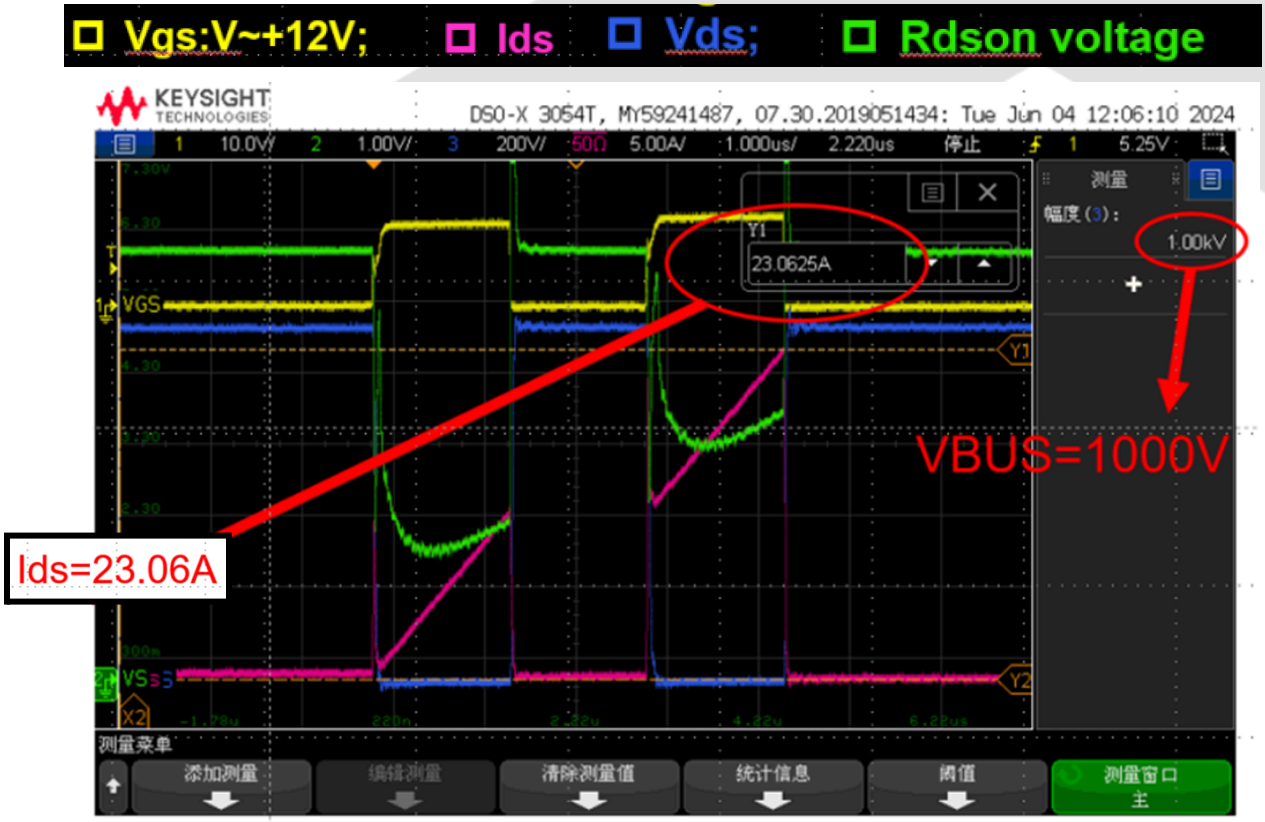
Electrical Performance - Dynamic Test



- Double pulse testing using inductance load (L) of 128µH at V_{BUS} = 1000V and I_{DS} = 23A
- Clamp diode circuit is used to measure dynamic R_{DSON} = 127mΩ

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- Switching performance (Inductive load switching)

	Parameters		Conditions	Sample#1	Sample#2	Unit
1	$t_{D(ON)}$	Turn-on delay time	V_{DS} = 800V I_D = 15A V_{GS} = 0V/12V	6.40	6.08	ns
2	t_R	Rise time		33.92	30.72	ns
3	$t_{D(OFF)}$	Turn-off delay time		15.36	14.40	ns
4	t_F	Fall time		17.28	16.64	ns
5	E_{ON}	Turn-on energy		182.34	162.26	µJ
6	E_{OFF}	Turn-off energy		84.76	83.37	µJ

Thermal and Soldering Characteristics

	Symbols	Parameters	Value	Unit	Package
1	R_{thJC}	Thermal resistance (junction to case)	0.6	°C/W	TO247-4
			0.27		TOLL-3
2	R_{thJA}	Thermal resistance (junction to ambient)	62	°C/W	TO247-4
			40		TOLL-3
3	T_{solder}	Reflow soldering temperature	260	°C	All

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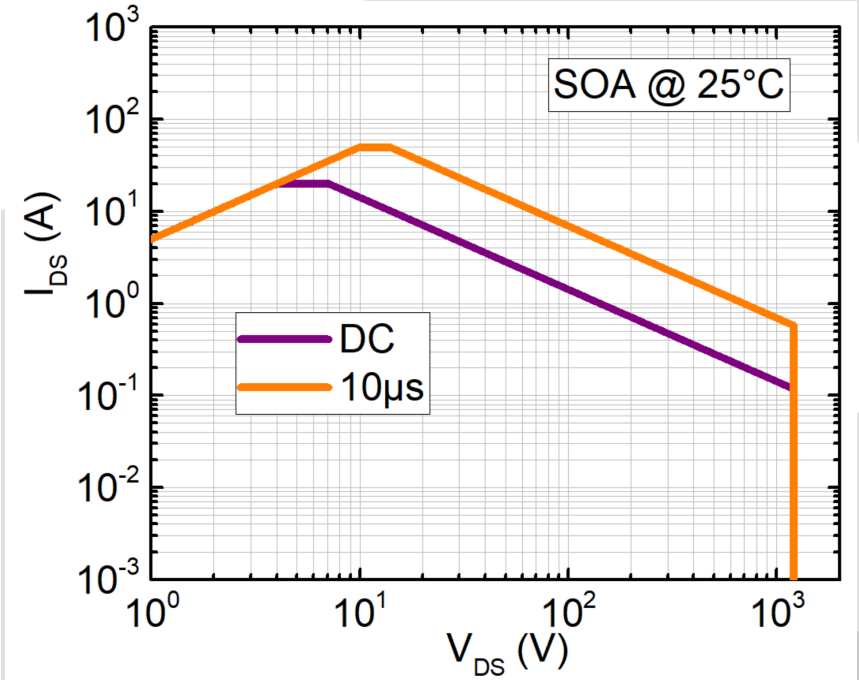
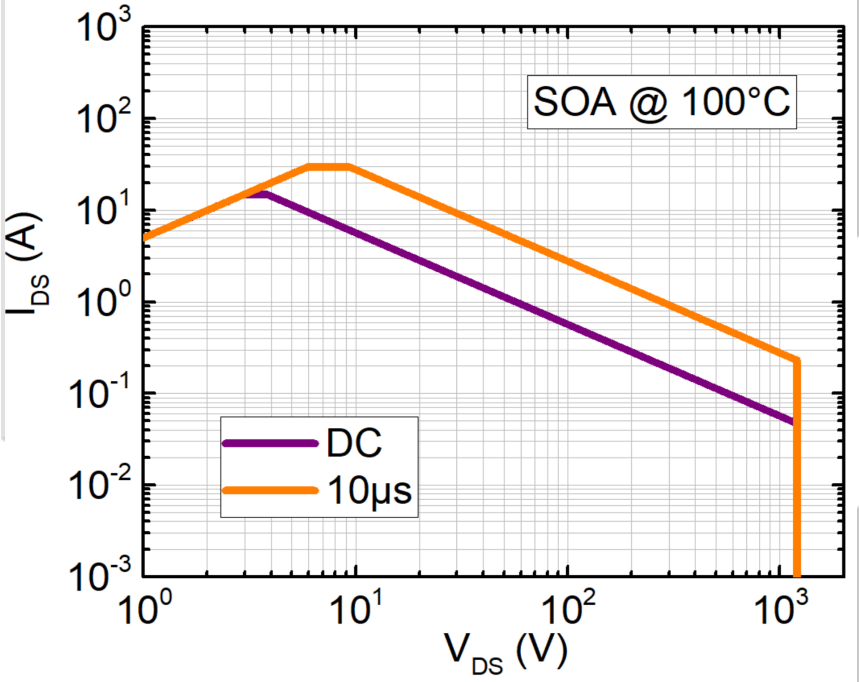
Safe Operating Area (SOA)





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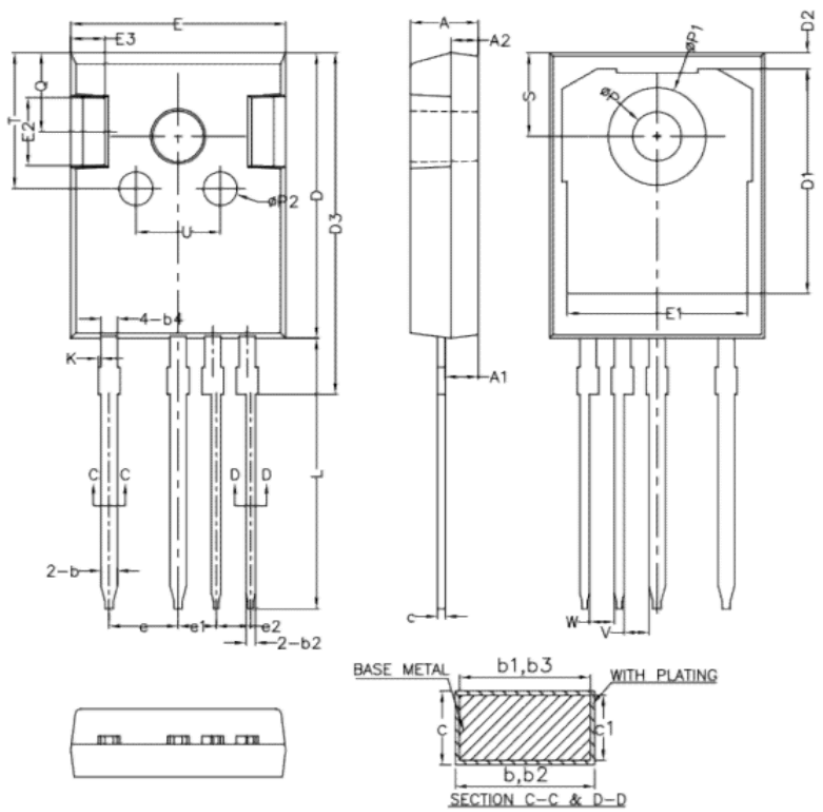
Package Information



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	4.90	5.00	5.10
A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
b	1.16	–	1.29
b1	1.15	1.20	1.25
b2	0.66	–	0.79
b3	0.65	0.70	0.75
b4	1.16	–	1.29
c	0.59	–	0.66
c1	0.58	0.60	0.62
D	20.90	21.00	21.10
D1	16.25	16.55	16.85
D2	1.05	1.20	1.35
D3	24.97	25.12	25.27
E	15.70	15.80	15.90
E1	13.10	13.30	13.50
E2	4.90	5.00	5.10
E3	2.40	2.50	2.60
e	4.98	5.08	5.18
e1	2.69	2.79	2.89
e2	2.44	2.54	2.64
K	0	–	0.20
L	19.80	19.92	20.10
P	3.50	3.60	3.70
P1	–	–	7.40
P2	2.40	2.50	2.60
Q	5.60	–	6.00
S	6.00	6.15	6.30
T	9.80	–	10.20
U	6.00	–	6.40
V	1.44	1.84	2.24
W	1.44	1.84	2.24

NOTES:
1.ALL DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.
2.EJECTION MARK DEPTH $0.10^{+0.15}_{-0.05}$.

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Further Information

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Data Source– Data here are based on recent tests but all parameters may not be up to date. Actual final test data from packaging production are available for selected customers upon request.