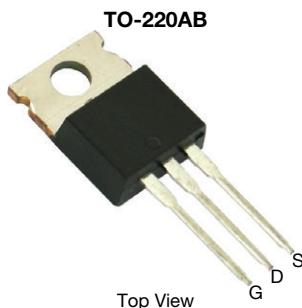


P-Channel 60 V (D-S) MOSFET



FEATURES

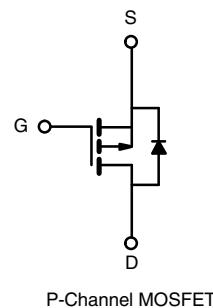
- TrenchFET® power MOSFET
- 100 % UIS tested
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912



RoHS
COMPLIANT

APPLICATIONS

- Load switch



PRODUCT SUMMARY

V _{DS} (V)	-60
R _{DS(on)} max. (Ω) at V _{GS} = -10 V	0.0195
R _{DS(on)} max. (Ω) at V _{GS} = -4.5 V	0.0250
Q _g typ. (nC)	76
I _D (A) ^a	-53
Configuration	Single

ORDERING INFORMATION

Package	TO-220AB
Lead (Pb)-free	SUP53P06-20-E3

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	V _{DS}	-60	V
Gate-source voltage	V _{GS}	± 20	
Continuous drain current (T _J = 150 °C)	T _C = 25 °C	-53 ^a	A
	T _C = 70 °C	-46.8	
	T _A = 25 °C	9.2 ^b	
	T _A = 70 °C	-8.1 ^b	
Pulsed drain current	I _{DM}	-150	
Avalanche current pulse	I _{AS}	-45	
Single pulse avalanche energy	E _{AS}	101	mJ
Continuous source-drain diode current	T _C = 25 °C	69 ^a	A
	T _A = 25 °C	2.1 ^b	
Maximum power dissipation	T _C = 25 °C	104.2 ^a	W
	T _C = 70 °C	66.7 ^a	
	T _A = 25 °C	3.1 ^b	
	T _A = 70 °C	2 ^b	
Operating junction and storage temperature range	T _J , T _{stg}	-55 to +150	°C

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient ^b	R _{thJA}	33	40	°C/W
Maximum junction-to-case	R _{thJC}	0.98	1.2	

Notes

a. Based on T_C = 25 °C

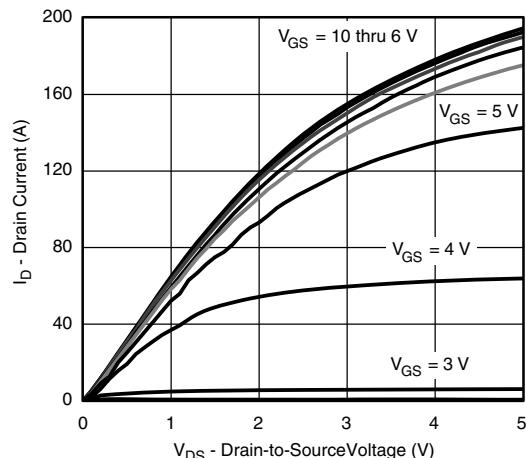
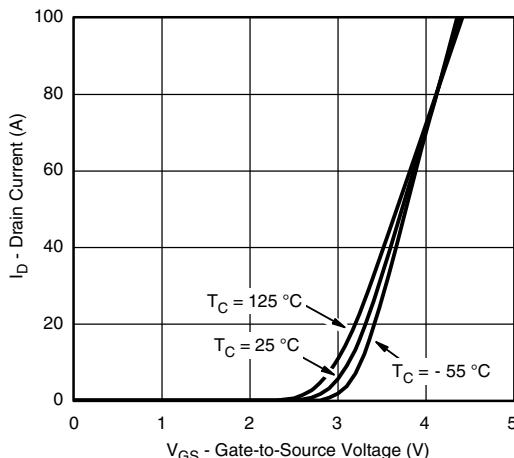
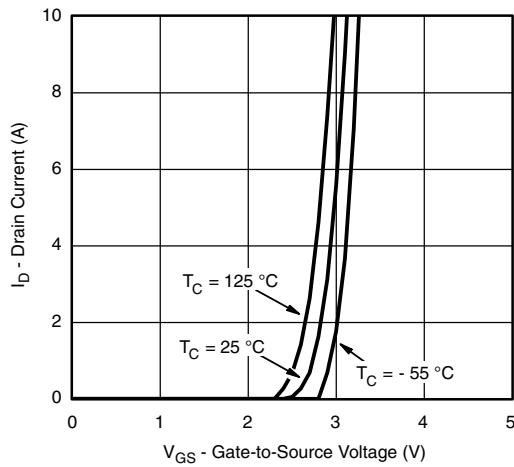
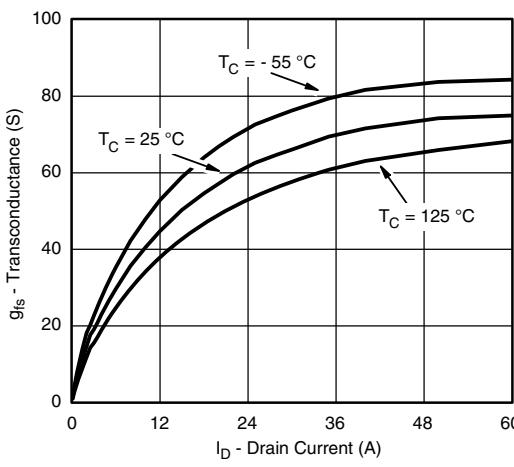
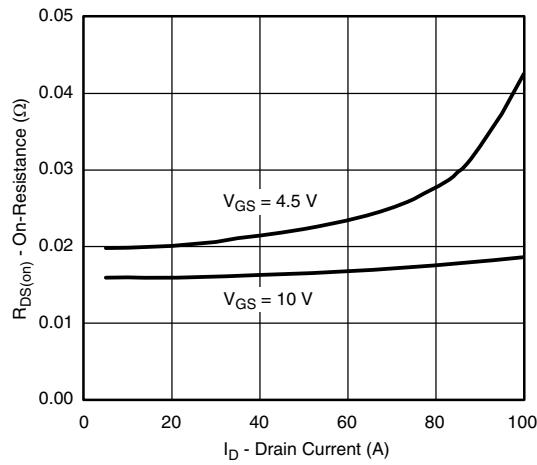
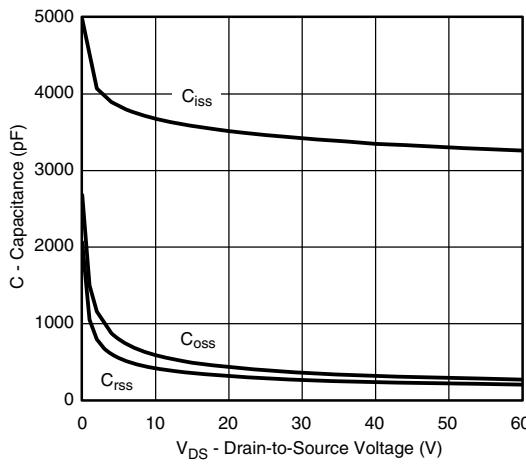
b. Surface mounted on 1" x 1" FR4 board

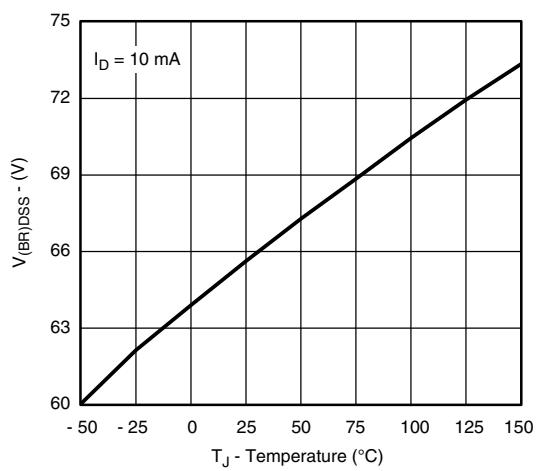
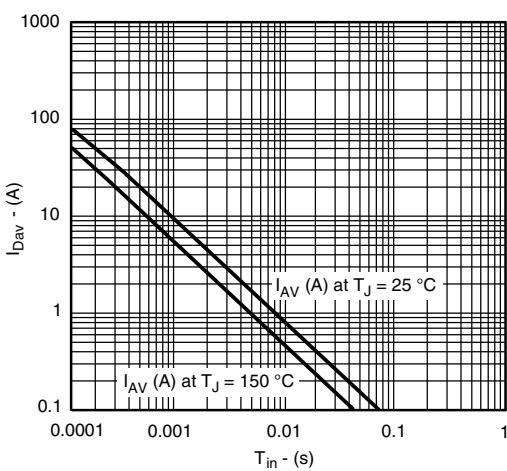
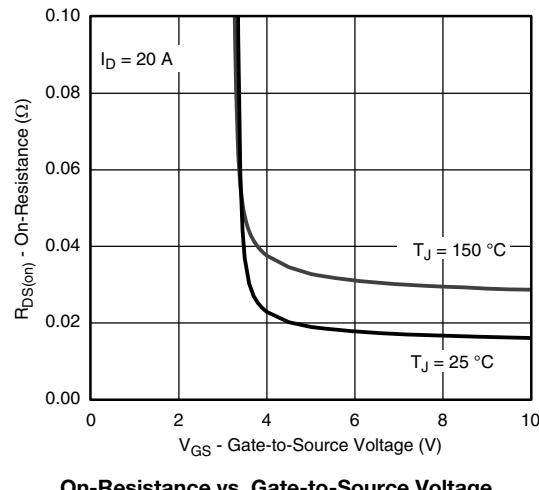
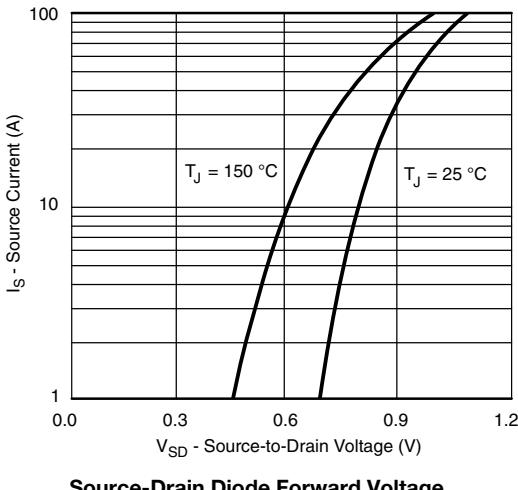
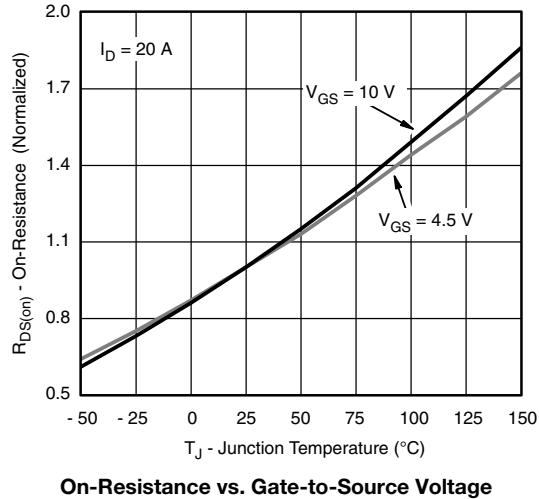
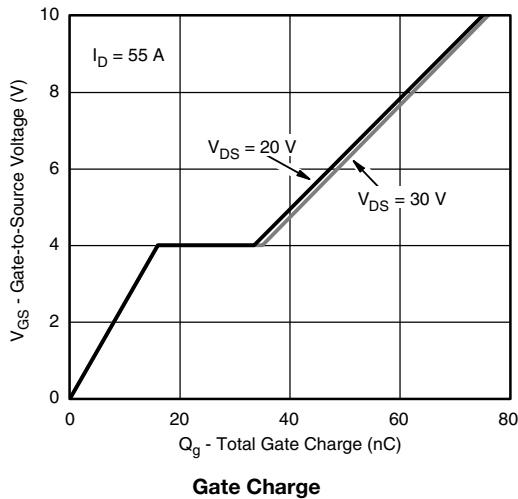
SPECIFICATIONS ($T_J = 25^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V_{DS}	$V_{GS} = 0 \text{ V}, I_D = -250 \mu\text{A}$	-60	-	-	V
V_{DS} temperature coefficient	$\Delta V_{DS}/T_J$	$I_D = -250 \mu\text{A}$	-	68	-	mV/ $^\circ\text{C}$
$V_{GS(\text{th})}$ temperature coefficient	$\Delta V_{GS(\text{th})}/T_J$		-	-5.2	-	
Gate-source threshold voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}, I_D = -250 \mu\text{A}$	-1	-	-3	V
Gate-source leakage	I_{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$	-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	$V_{DS} = -60 \text{ V}, V_{GS} = 0 \text{ V}$	-	-	-1	μA
		$V_{DS} = -60 \text{ V}, V_{GS} = 0 \text{ V}, T_J = 55^\circ\text{C}$	-	-	-10	
On-state drain current ^a	$I_{D(\text{on})}$	$V_{DS} = -5 \text{ V}, V_{GS} = -10 \text{ V}$	-120	-	-	A
Drain-source on-state resistance ^a	$R_{DS(\text{on})}$	$V_{GS} = -10 \text{ V}, I_D = -30 \text{ A}$	-	0.0160	0.0195	Ω
		$V_{GS} = -4.5 \text{ V}, I_D = -20 \text{ A}$	-	0.0200	0.0250	
Forward transconductance ^a	g_{fs}	$V_{DS} = -15 \text{ V}, I_D = -50 \text{ A}$	20	-	-	S
Dynamic ^b						
Input capacitance	C_{iss}	$V_{DS} = -25 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	-	3500	-	pF
Output capacitance	C_{oss}		-	390	-	
Reverse transfer capacitance	C_{rss}		-	290	-	
Total gate charge	Q_g	$V_{DS} = -30 \text{ V}, V_{GS} = -10 \text{ V}, I_D = -55 \text{ A}$	-	76	115	nC
Gate-source charge	Q_{gs}		-	38	60	
Gate-drain charge	Q_{gd}		-	16	-	
Gate resistance	R_g		-	19	-	
Turn-on delay time	$t_{d(\text{on})}$	$V_{DD} = -2 \text{ V}, R_L = 2 \Omega$ $I_D \equiv -10 \text{ A}, V_{GEN} = -10 \text{ V}, R_g = 1 \Omega$	-	5.2	-	Ω
Rise time	t_r		-	10	15	ns
Turn-off delay time	$t_{d(\text{off})}$		-	7	15	
Fall time	t_f		-	70	110	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I_S	$T_C = 25^\circ\text{C}$	-	-	-69	A
Pulse diode forward current ^a	I_{SM}		-	-	-150	
Body diode voltage	V_{SD}	$I_S = -30 \text{ A}$	-	-1	-1.5	V
Body diode reverse recovery time	t_{rr}	$I_F = -50 \text{ A}, di/dt = 100 \text{ A}/\mu\text{s}, T_J = 25^\circ\text{C}$	-	45	68	ns
Body diode reverse recovery charge	Q_{rr}		-	59	120	
Reverse recovery fall time	t_a		-	29	-	ns
Reverse recovery rise time	t_b		-	16	-	

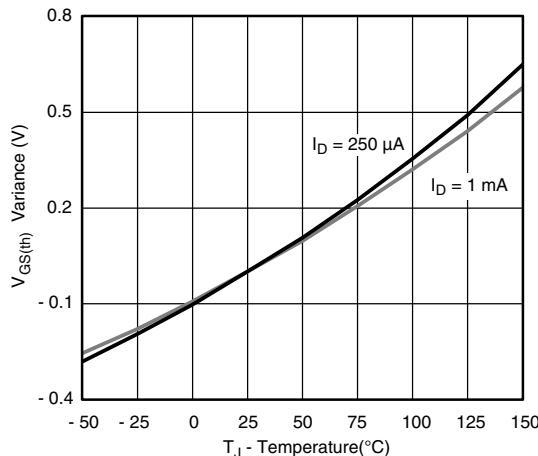
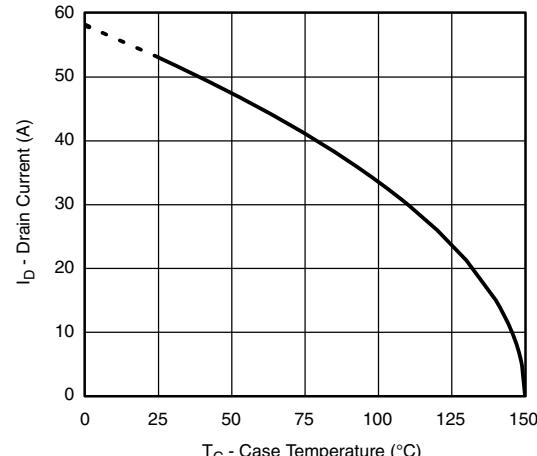
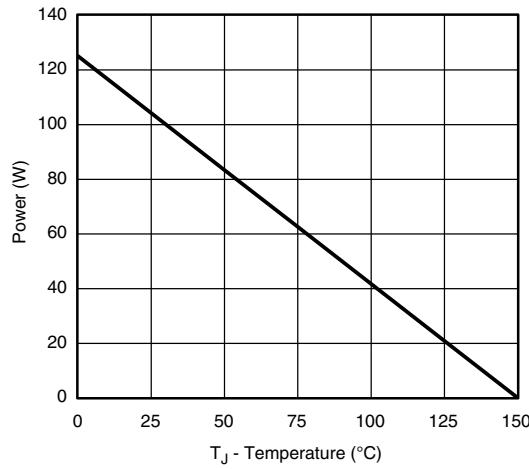
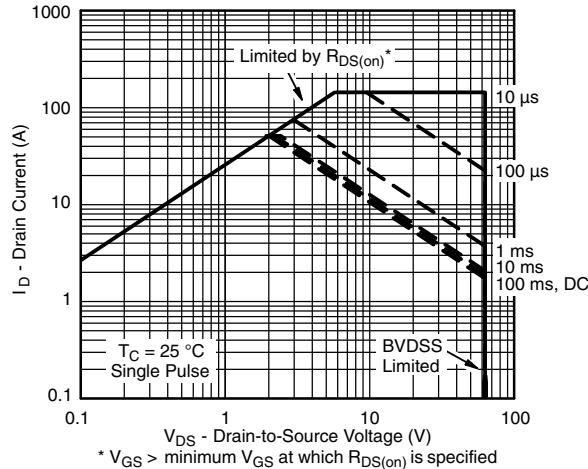
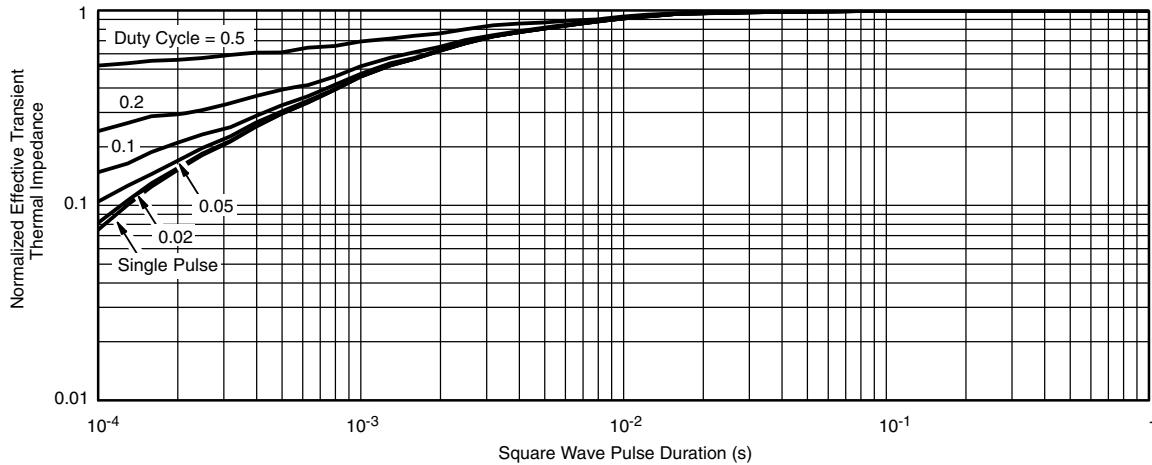
Notes

- a. Pulse test; pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2 \%$
- b. Guaranteed by design, not subject to production testing

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

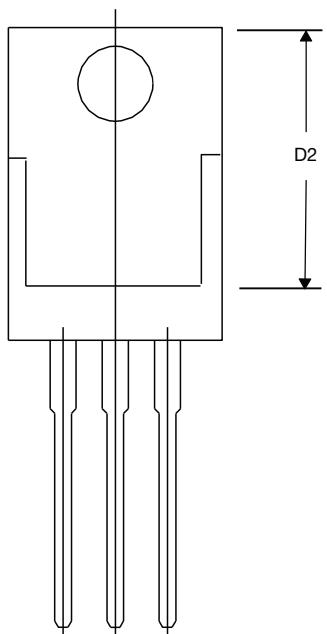
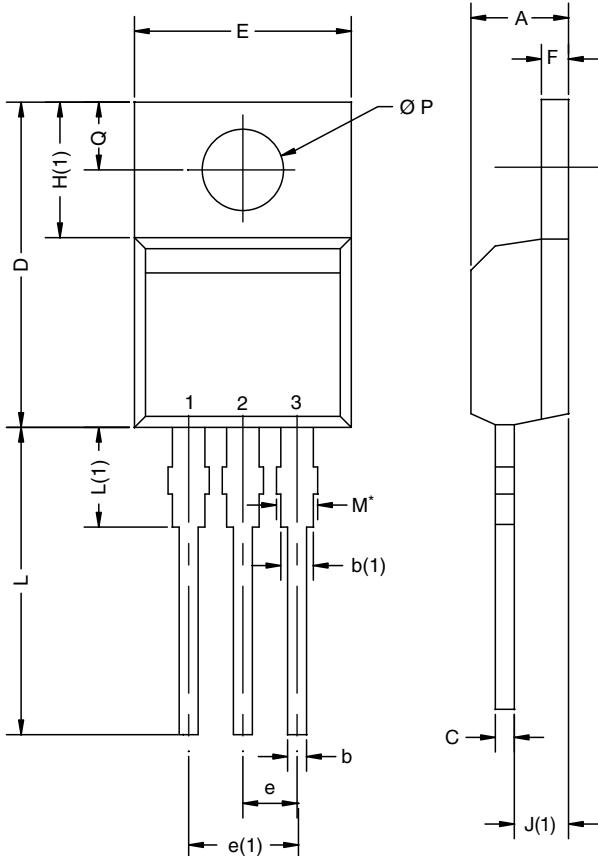
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Output Characteristics

Transfer Characteristics

Transfer Characteristics

Transconductance

On-Resistance vs. Drain Current

Capacitance

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)


TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Threshold Voltage

Max. Drain Current vs. Case Temperature

Power Derating, Junction-to-Case

Safe Operating Area, Junction-to-Case

Normalized Thermal Transient Impedance, Junction-to-Case

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TO-220AB



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
D2	12.19	12.70	0.480	0.500
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	6.09	6.48	0.240	0.255
J(1)	2.41	2.92	0.095	0.115
L	13.35	14.02	0.526	0.552
L(1)	3.32	3.82	0.131	0.150
Ø P	3.54	3.94	0.139	0.155
Q	2.60	3.00	0.102	0.118

Note

* M = 1.32 mm to 1.62 mm (dimension including protrusion)
Heatsink hole for HVM



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