

Automotive P-Channel 60 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

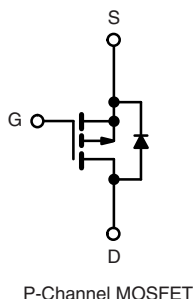
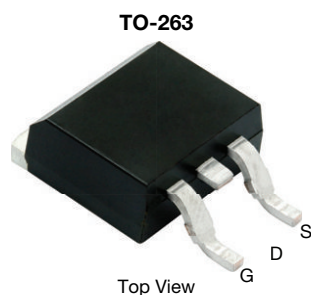
V_{DS} (V)	-60
$R_{DS(on)}$ (Ω) at $V_{GS} = -10$ V	0.0067
$R_{DS(on)}$ (Ω) at $V_{GS} = -4.5$ V	0.0088
I_D (A)	-120
Configuration	Single

FEATURES

- TrenchFET® power MOSFET
- Package with low thermal resistance
- 100 % R_g and UIS tested
- AEC-Q101 qualified ^d
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE



ORDERING INFORMATION

Package	TO-263
Lead (Pb)-free and Halogen-free	SQM120P06-07L-GE3

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

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^a	I_D	$T_C = 25$ °C ^a	-120
		$T_C = 125$ °C	-98
Continuous Source Current (Diode Conduction) ^a	I_S	-120	A
Pulsed Drain Current ^b	I_{DM}	-480	A
Single Pulse Avalanche Current	I_{AS}	-80	A
Single Pulse Avalanche Energy	E_{AS}	320	mJ
Maximum Power Dissipation ^b	P_D	$T_C = 25$ °C	375
		$T_C = 125$ °C	125
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +175	°C

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient	R_{thJA}	40	°C/W
Junction-to-Case (Drain)	R_{thJC}	0.4	°C/W

Notes

- Package limited.
- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR4 material).
- Parametric verification ongoing.



SPECIFICATIONS (T _C = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = -250 μA		-60	-	-	V
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250 μA		-1.5	-2.0	-2.5	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V	V _{DS} = -60 V	-	-	-1	μA
		V _{GS} = 0 V	V _{DS} = -60 V, T _J = 125 °C	-	-	-50	
		V _{GS} = 0 V	V _{DS} = -60 V, T _J = 175 °C	-	-	-250	
On-State Drain Current ^a	I _{D(on)}	V _{GS} = -10 V	V _{DS} ≤ -5 V	-120	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = -10 V	I _D = -30 A	-	0.0056	0.0067	Ω
		V _{GS} = -10 V	I _D = -30 A, T _J = 125 °C	-	-	0.0110	
		V _{GS} = -10 V	I _D = -30 A, T _J = 175 °C	-	-	0.0130	
		V _{GS} = -4.5 V	I _D = -20 A	-	0.0070	0.0088	
Forward Transconductance ^b	g _{fs}	V _{DS} = -15 V, I _D = -30 A		-	90	-	S
Dynamic ^b							
Input Capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = -25 V, f = 1 MHz	-	11 423	14 280	pF
Output Capacitance	C _{oss}			-	1034	1295	
Reverse Transfer Capacitance	C _{rss}			-	809	1015	
Total Gate Charge ^c	Q _g	V _{GS} = -10 V	V _{DS} = -30 V, I _D = -110 A	-	180	270	nC
Gate-Source Charge ^c	Q _{gs}			-	31	-	
Gate-Drain Charge ^c	Q _{gd}			-	43	-	
Gate Resistance	R _g	f = 1 MHz		1.1	2.27	3.5	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = -30 V, R _L = 0.27 Ω I _D ≅ -110 A, V _{GEN} = -10 V, R _g = 1 Ω		-	15	23	ns
Rise Time ^c	t _r			-	23	35	
Turn-Off Delay Time ^c	t _{d(off)}			-	97	146	
Fall Time ^c	t _f			-	32	48	
Source-Drain Diode Ratings and Characteristics ^b							
Pulsed Current ^a	I _{SM}			-	-	-480	A
Forward Voltage	V _{SD}	I _F = -100 A, V _{GS} = 0 V		-	-0.95	-1.5	V

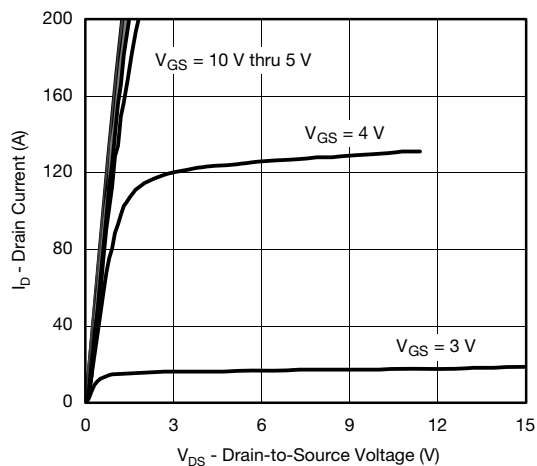
Notes

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

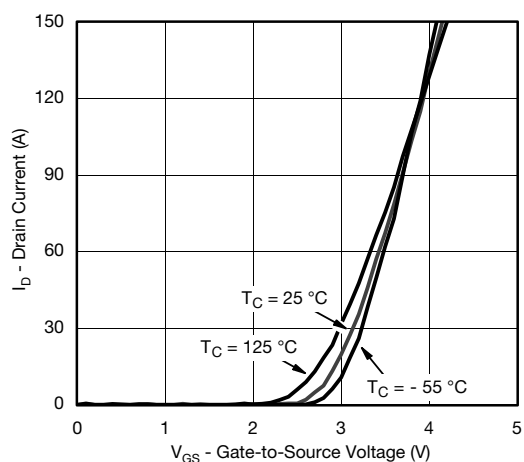
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



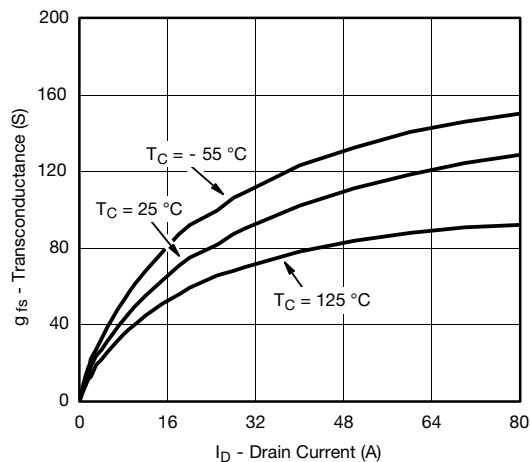
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



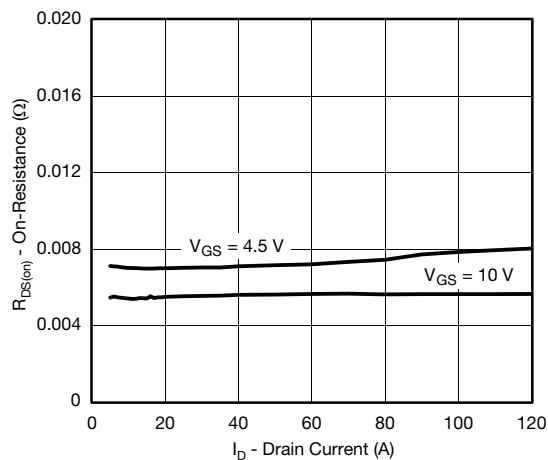
Output Characteristics



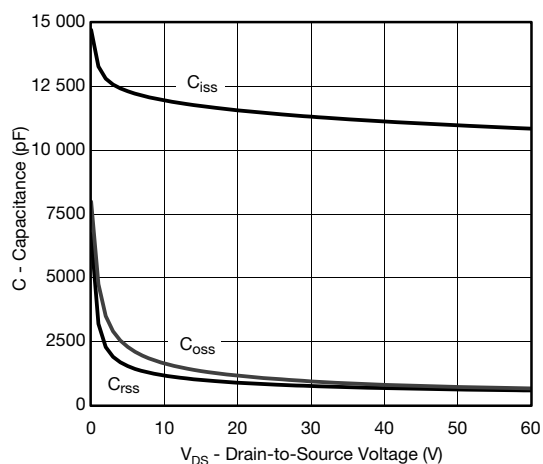
Transfer Characteristics



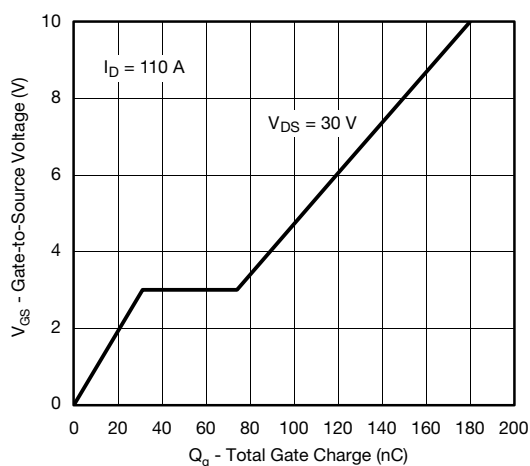
Transconductance



On-Resistance vs. Drain Current



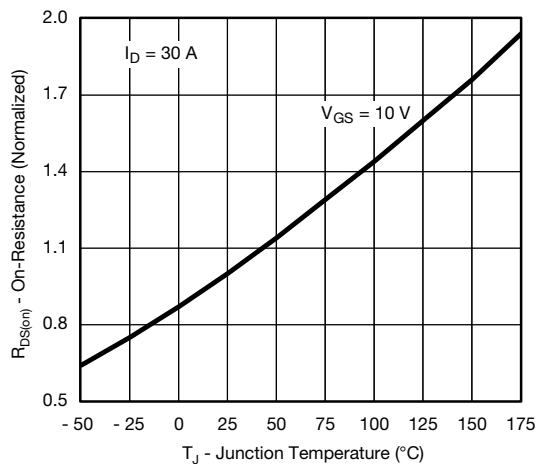
Capacitance



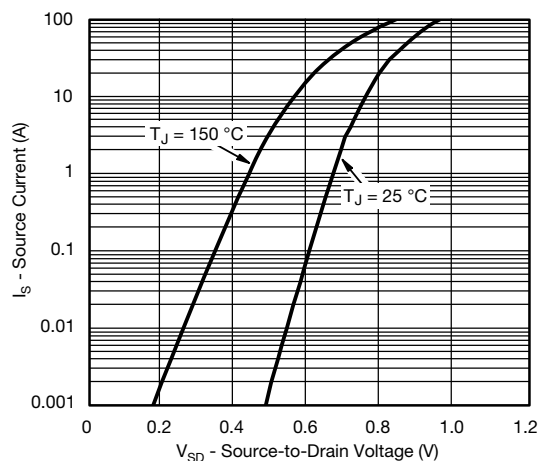
Gate Charge



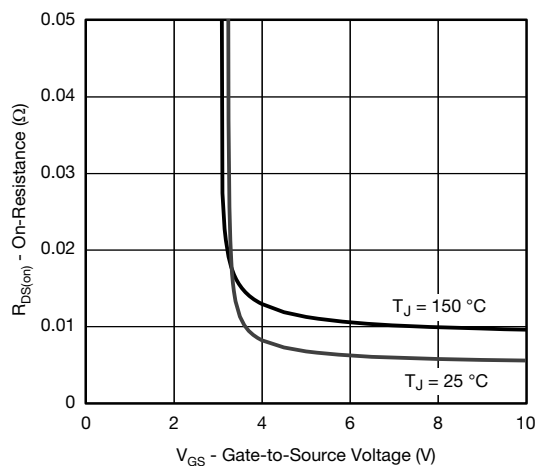
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



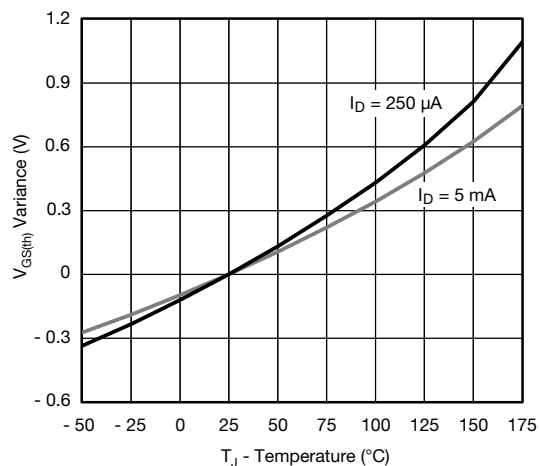
On-Resistance vs. Junction Temperature



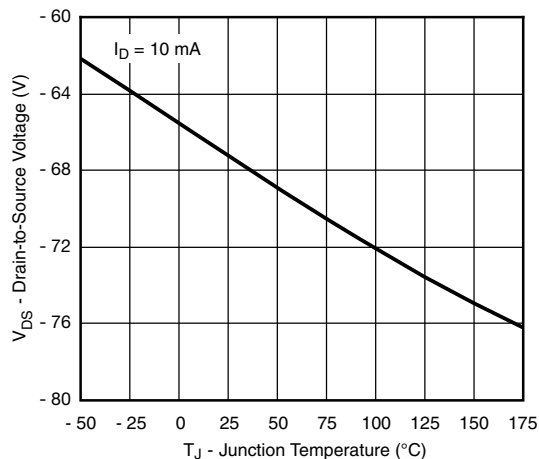
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



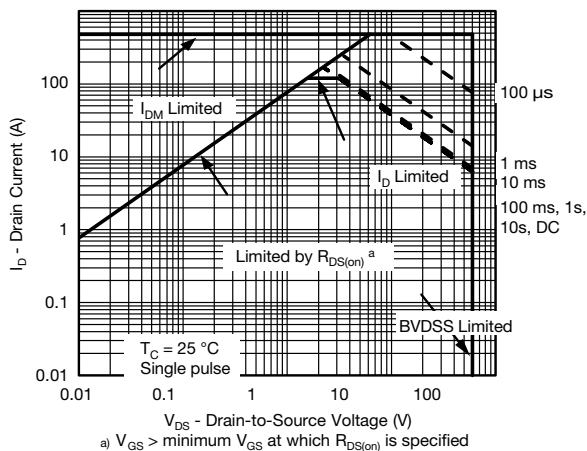
Threshold Voltage



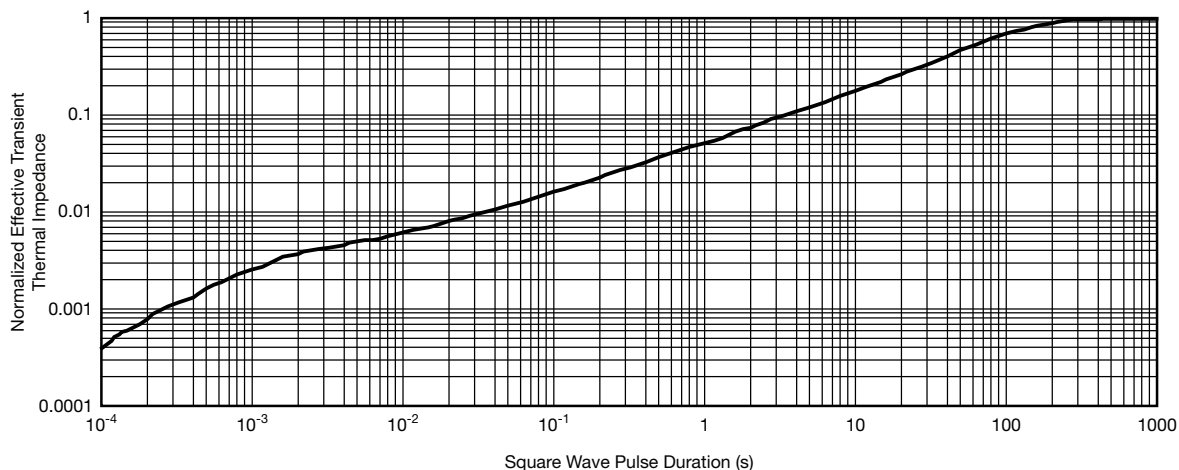
Drain Source Breakdown vs. Junction Temperature



THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



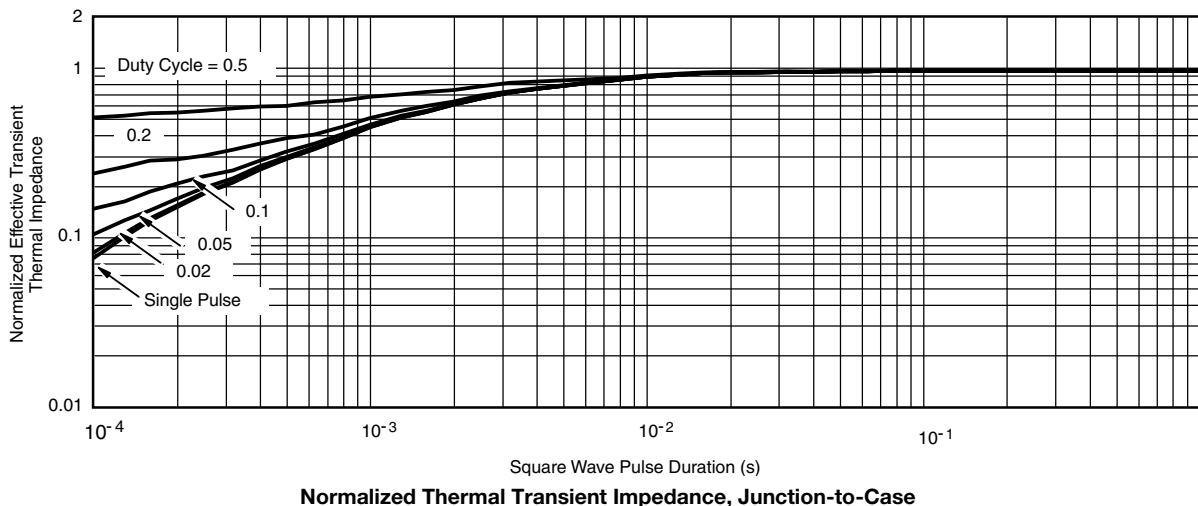
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



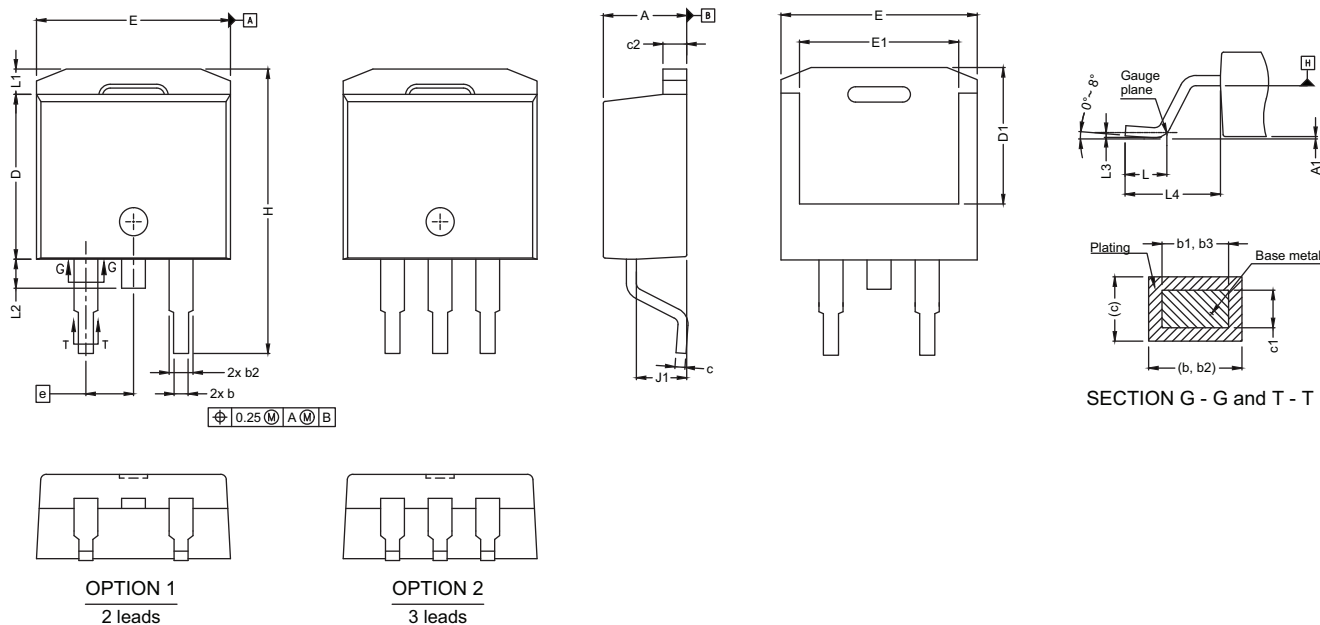
Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction to Ambient ($25\text{ }^{\circ}\text{C}$)
 - Normalized Transient Thermal Impedance Junction to Case ($25\text{ }^{\circ}\text{C}$)are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

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VERSION 2: FACILITY CODE = N



DIM.	MIN.	MAX.
A	4.36	4.56
A1	0	0.25
b	0.70	0.90
b1	0.51	0.89
b2	1.20	1.46
b3	1.17	1.37
c	0.38	0.694
c1	0.38	0.534
c2	1.19	1.34
D	8.60	9.00
D1	6.9	7.5
E	10.15	10.55
E1	8.1	8.7
e	2.54 BSC	
H	15.0	15.6
L	1.9	2.5
L1	-	1.65
L2	-	1.78
L3	0.25 typ.	
L4	4.78	5.28
J1	2.56	2.96
ECN: S24-1080-Rev. L, 28-Oct-2024		
DWG: 5843		

RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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