

# N - CHANNEL ENHANCEMENT MODE " SINGLE FEATURE SIZE™ " POWER MOSFET

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STB80NE06-10	60 V	<0.01 $\Omega$	80 A

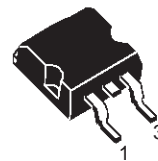
- TYPICAL R<sub>DS(on)</sub> = 0.0085  $\Omega$
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- APPLICATION ORIENTED CHARACTERIZATION
- FOR THROUGH-HOLE VERSION CONTACT SALES OFFICE

## DESCRIPTION

This Power MOSFET is the latest development of SGS-THOMSON unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

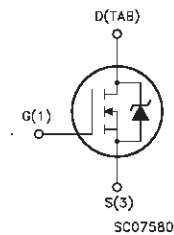
## APPLICATIONS

- SOLENOID AND RELAY DRIVERS
- MOTOR CONTROL, AUDIO AMPLIFIERS
- DC-DC CONVERTERS
- AUTOMOTIVE ENVIRONMENT



**D²PAK  
TO-263**  
(suffix "T4")

## INTERNAL SCHEMATIC DIAGRAM



## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>DS</sub>	Drain-source Voltage (V <sub>GS</sub> = 0)	60	V
V <sub>DGR</sub>	Drain- gate Voltage (R <sub>GS</sub> = 20 k $\Omega$ )	60	V
V <sub>GS</sub>	Gate-source Voltage	$\pm 20$	V
I <sub>D</sub>	Drain Current (continuous) at T <sub>c</sub> = 25 °C	80	A
I <sub>D</sub>	Drain Current (continuous) at T <sub>c</sub> = 100 °C	57	A
I <sub>DM</sub> (•)	Drain Current (pulsed)	320	A
P <sub>tot</sub>	Total Dissipation at T <sub>c</sub> = 25 °C	150	W
	Derating Factor	1	W/°C
dv/dt	Peak Diode Recovery voltage slope	7	V/ns
T <sub>stg</sub>	Storage Temperature	-65 to 175	°C
T <sub>j</sub>	Max. Operating Junction Temperature	175	°C

(•) Pulse width limited by safe operating area

(1) I<sub>SD</sub>  $\leq$  80 A, di/dt  $\leq$  300 A/ $\mu$ s, V<sub>DD</sub>  $\leq$  V<sub>(BR)DSS</sub>, T<sub>j</sub>  $\leq$  T<sub>JMAX</sub>

## THERMAL DATA

$R_{thj-case}$	Thermal Resistance Junction-case	Max	1	$^{\circ}C/W$
$R_{thj-amb}$	Thermal Resistance Junction-ambient	Max	62.5	$^{\circ}C/W$
$R_{thc-sink}$	Thermal Resistance Case-sink	Typ	0.5	$^{\circ}C/W$
$T_l$	Maximum Lead Temperature For Soldering Purpose		300	$^{\circ}C$

## AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
$I_{AR}$	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by $T_j$ max, $\delta < 1\%$ )	80	A
$E_{AS}$	Single Pulse Avalanche Energy (starting $T_j = 25^{\circ}C$ , $I_D = I_{AR}$ , $V_{DD} = 30 V$ )	250	mJ

ELECTRICAL CHARACTERISTICS ( $T_{case} = 25^{\circ}C$  unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	$I_D = 250 \mu A$ $V_{GS} = 0$	60			V
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{GS} = 0$ )	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating}$ $T_c = 125^{\circ}C$			1 10	$\mu A$ $\mu A$
$I_{GSS}$	Gate-body Leakage Current ( $V_{DS} = 0$ )	$V_{GS} = \pm 20 V$			$\pm 100$	nA

ON (\*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ $I_D = 250 \mu A$	2	3	4	V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 10V$ $I_D = 40 A$		8.5	10	m $\Omega$
$I_{D(on)}$	On State Drain Current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $V_{GS} = 10 V$	80			A

## DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$g_{fs} (*)$	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $I_D = 40 A$	19	38		S
$C_{iss}$	Input Capacitance	$V_{DS} = 25 V$ $f = 1 MHz$ $V_{GS} = 0$		7600	10000	pF
$C_{oss}$	Output Capacitance			890	1100	pF
$C_{rss}$	Reverse Transfer Capacitance			150	200	pF

**ELECTRICAL CHARACTERISTICS** (continued)**SWITCHING ON**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Time	$V_{DD} = 30\text{ V}$ $I_D = 40\text{ A}$		50	65	ns
$t_r$	Rise Time	$R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (see test circuit, figure 3)		150	200	ns
$Q_g$	Total Gate Charge	$V_{DD} = 48\text{ V}$ $I_D = 80\text{ A}$ $V_{GS} = 10\text{ V}$		140		nC
$Q_{gs}$	Gate-Source Charge			20		nC
$Q_{gd}$	Gate-Drain Charge			50		nC

**SWITCHING OFF**

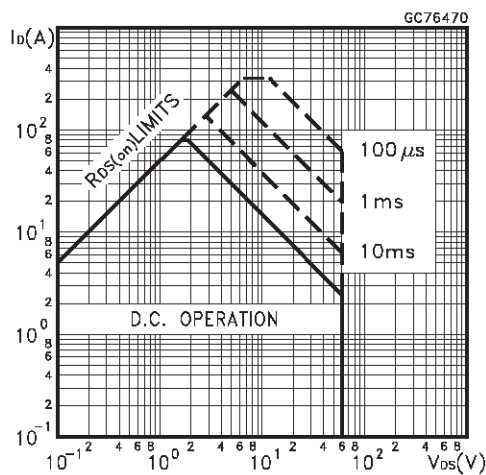
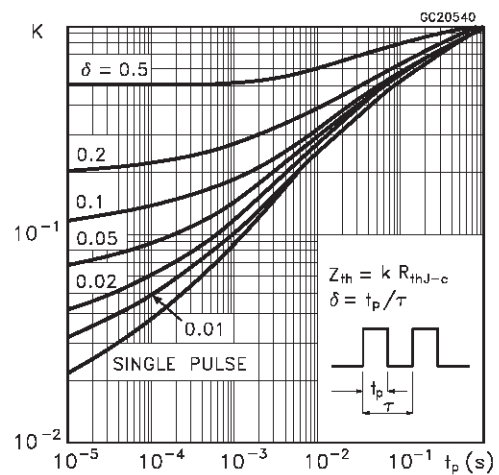
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_r(V_{off})$	Off-voltage Rise Time	$V_{DD} = 48\text{ V}$ $I_D = 40\text{ A}$		45	60	ns
$t_f$	Fall Time	$R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (see test circuit, figure 5)		75	100	ns
$t_c$	Cross-over Time			130	170	ns

**SOURCE DRAIN DIODE**

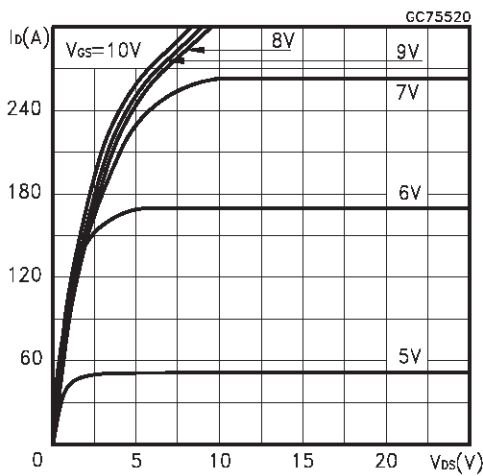
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain Current				80	A
$I_{SDM}(\bullet)$	Source-drain Current (pulsed)				320	A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 80\text{ A}$ $V_{GS} = 0$			1.5	V
$t_{rr}$	Reverse Recovery Time	$I_{SD} = 80\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 30\text{ V}$ $T_j = 150\text{ }^\circ\text{C}$ (see test circuit, figure 5)		100		ns
$Q_{rr}$	Reverse Recovery Charge			0.4		$\mu\text{C}$
$I_{RRM}$	Reverse Recovery Current			8		A

(\*) Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %

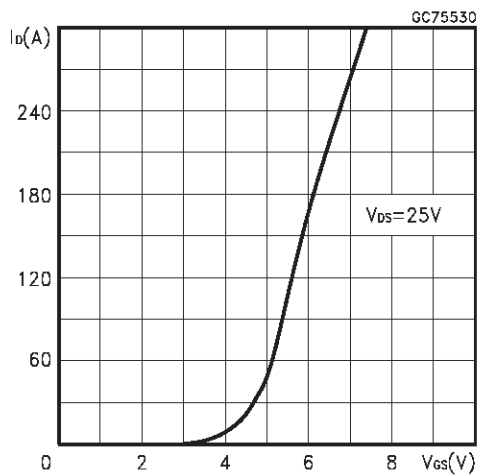
(\bullet) Pulse width limited by safe operating area

**Safe Operating Area for****Thermal Impedance**

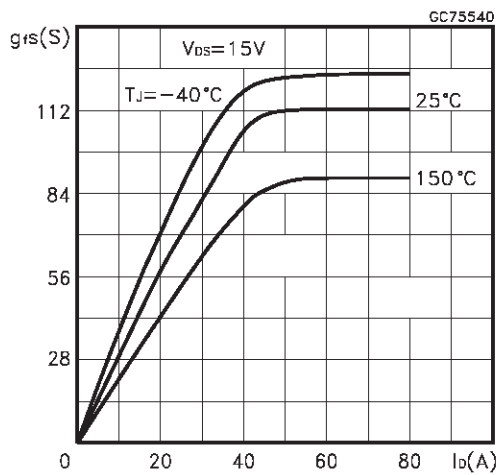
Output Characteristics



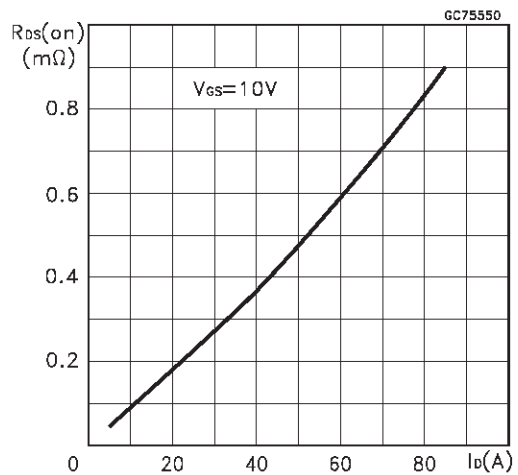
Transfer Characteristics



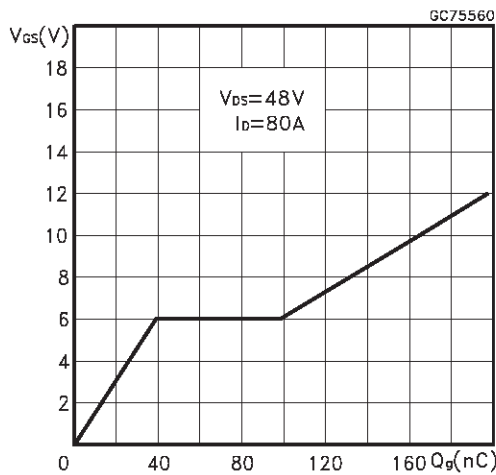
Transconductance



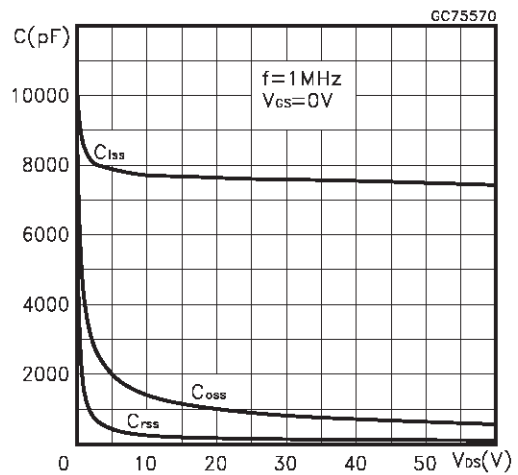
Static Drain-source On Resistance



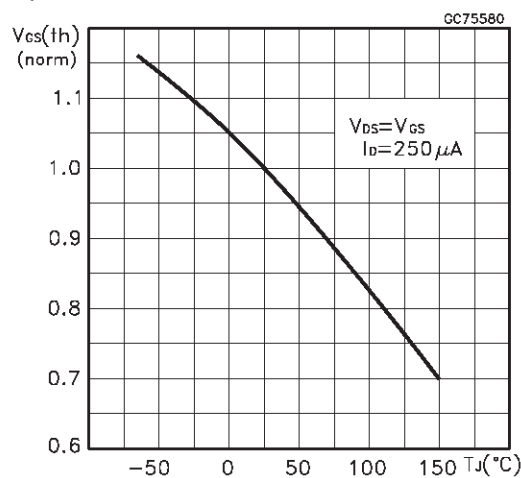
Gate Charge vs Gate-source Voltage



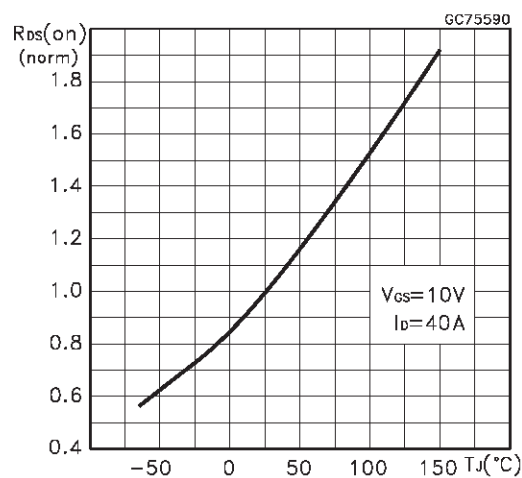
Capacitance Variations



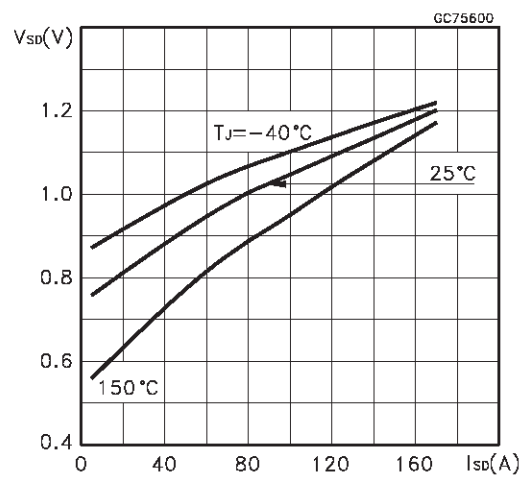
Normalized Gate Threshold Voltage vs Temperature



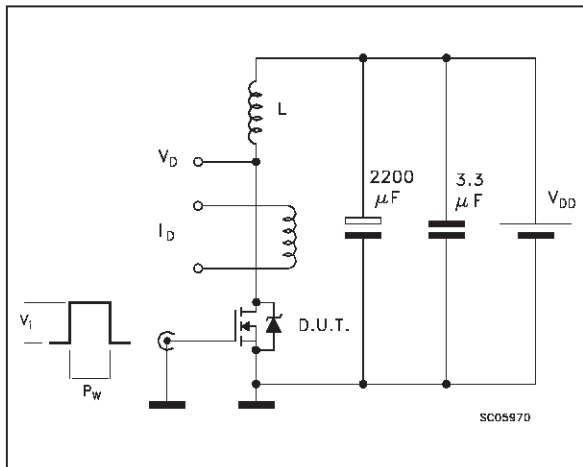
Normalized On Resistance vs Temperature



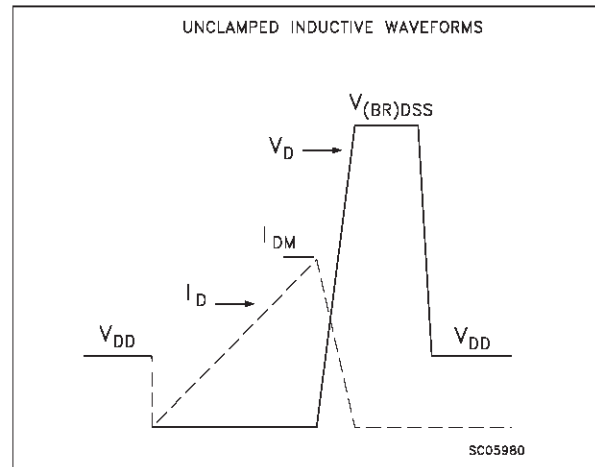
Source-drain Diode Forward Characteristics



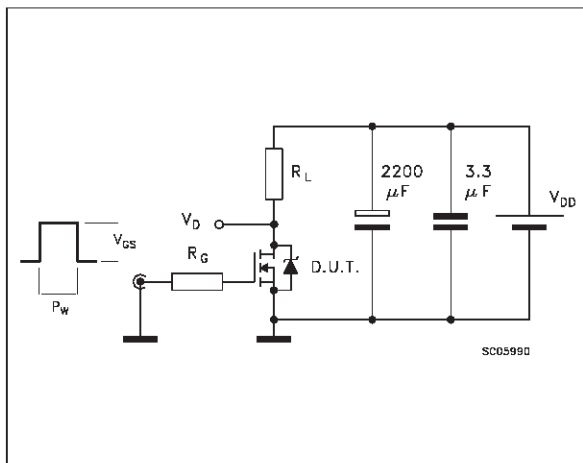
**Fig. 1: Unclamped Inductive Load Test Circuit**



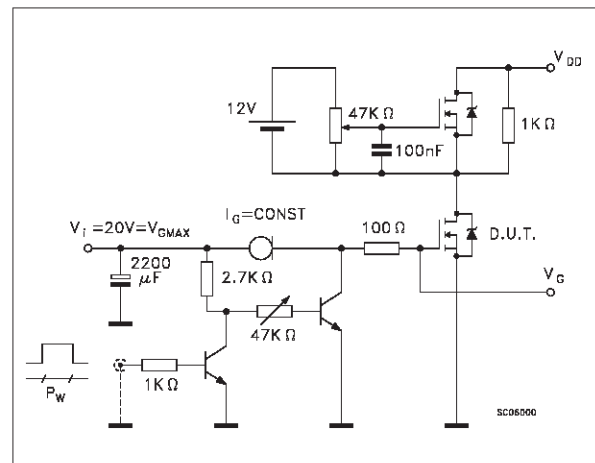
**Fig. 2: Unclamped Inductive Waveform**



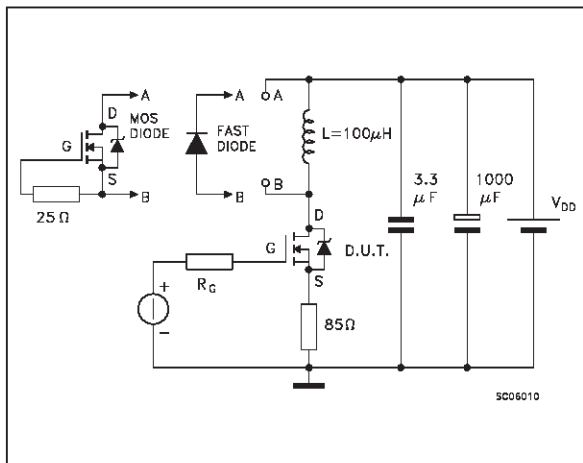
**Fig. 3: Switching Times Test Circuits For Resistive Load**



**Fig. 4: Gate Charge test Circuit**

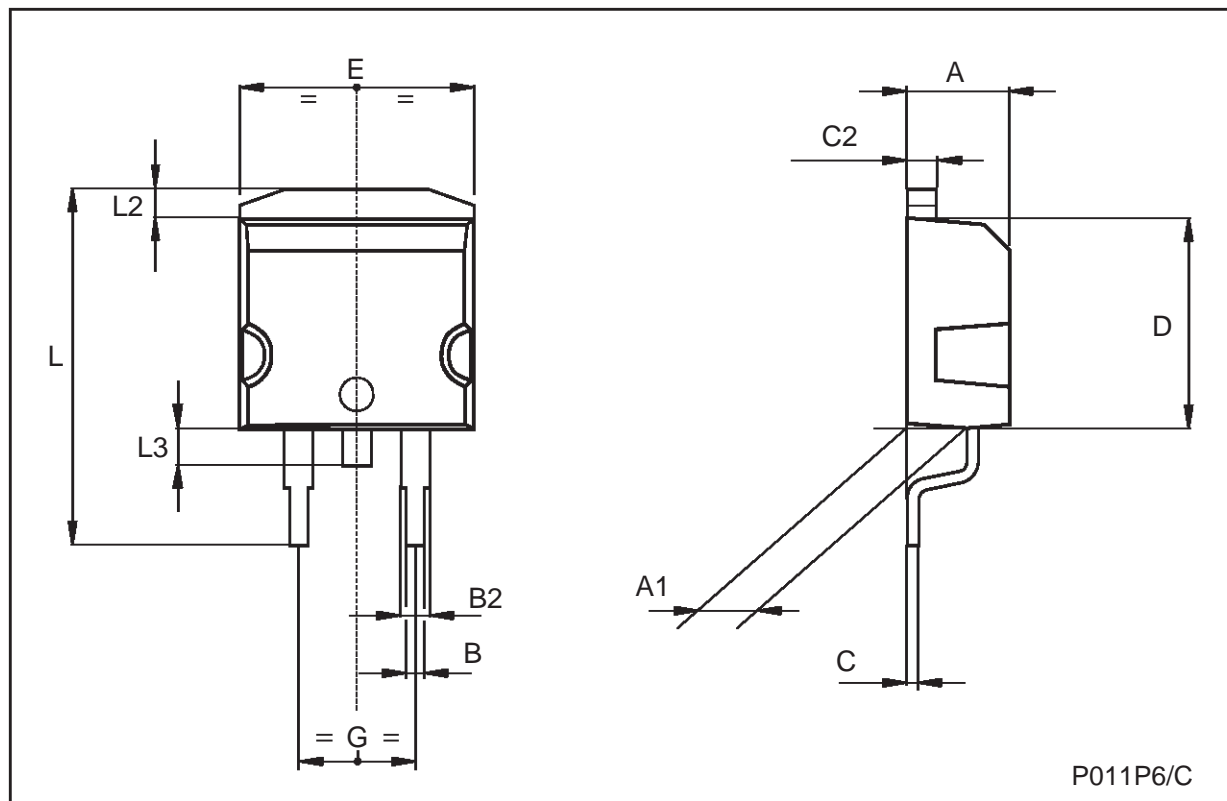


**Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times**



TO-263 (D<sup>2</sup>PAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.3		4.6	0.169		0.181
A1	2.49		2.69	0.098		0.106
B	0.7		0.93	0.027		0.036
B2	1.25		1.4	0.049		0.055
C	0.45		0.6	0.017		0.023
C2	1.21		1.36	0.047		0.053
D	8.95		9.35	0.352		0.368
E	10		10.28	0.393		0.404
G	4.88		5.28	0.192		0.208
L	15		15.85	0.590		0.624
L2	1.27		1.4	0.050		0.055
L3	1.4		1.75	0.055		0.068



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